


# 1450-1

(SN B020000 & UP)

*Please Check for  
CHANGE INFORMATION  
at the Rear of this Manual*

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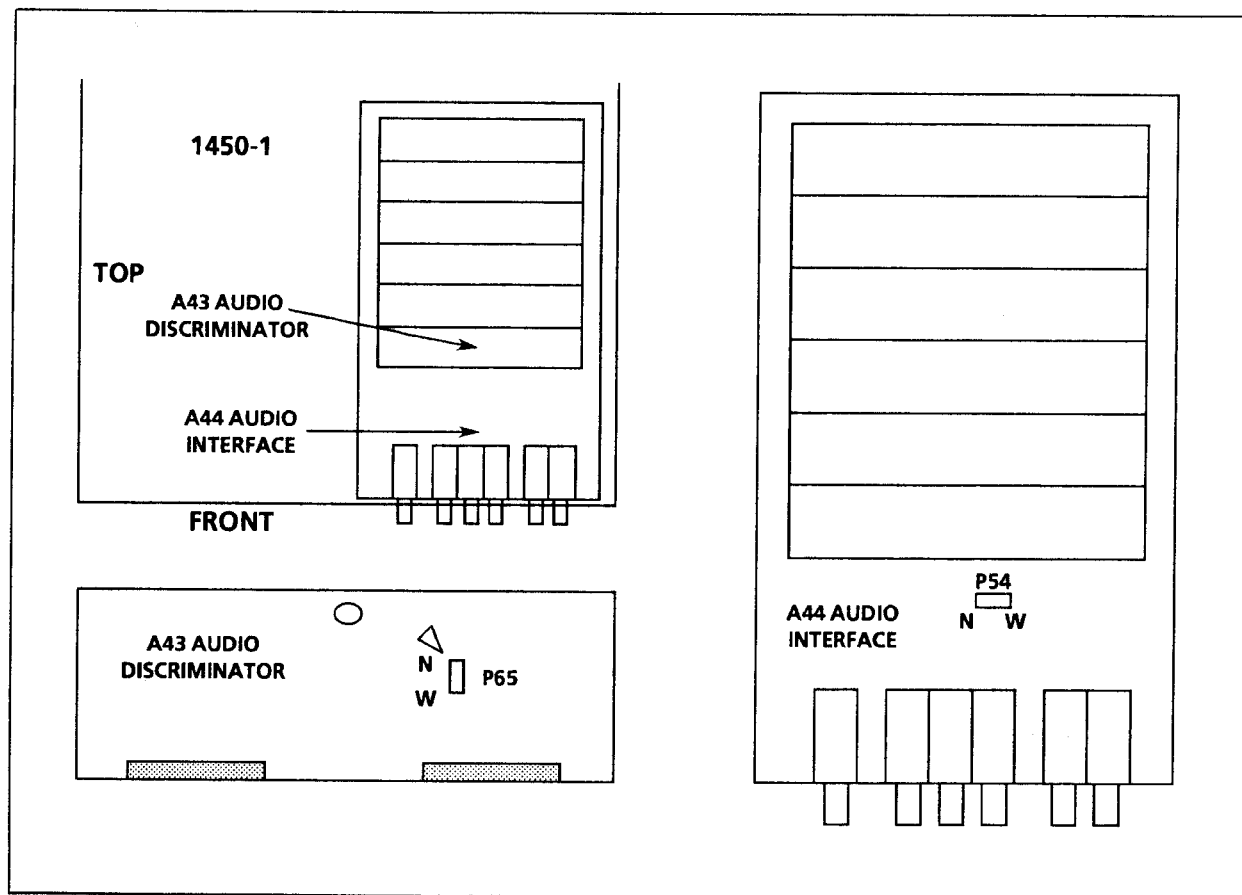


# NOTICE

This 1450-1 is set for **BTSC Stereo** operation.

If you need to set the 1450-1 for **Monaural** operation, perform the following steps:

1. Remove the top cover.
2. Remove the cover from the A43 cavity and remove the A43 Audio Discriminator board. See the figure below.
3. Move the jumper on P65 on the A43 Audio Discriminator board to the **Narrow** position (Narrow for mono use and Wide for stereo). See the figure below.
4. Return the A43 Audio Discriminator board to its cavity and replace the cavity cover.
5. Move the jumper on P54 on the A44 Audio Interface board to the **Narrow** position (Narrow for mono use and Wide for stereo). See the figure below.
6. Replace the top cover.



[illegible]

# PREFACE

This manual documents the TEKTRONIX 1450-1 Television Demodulator. The 1450-1 uses a plug-in down converter for channel selection. The appropriate down converter instruction manual should also be consulted for information about using the 1450-1 and down converter as a system.

This Preface describes the contents of the manual, with a brief description of each section within the manual.

The Table of Contents is a detailed list of all important pieces of information and their location in the manual. Lists of Illustrations and Tables follow the Table of Contents.

Operators Safety and Servicing Safety Summaries give general safety information about the instrument.

The manual is split into two parts, Operator's Information and Servicing Information. All pertinent information regarding the operation of the instrument is located in the Operator's part. This will be of use to both the operator and the service technician. The Servicing part contains that information necessary to effectively service the instrument. This information should be useful only to qualified service technicians.

The Operator's part includes Sections 1 and 2:

Section 1 (Introduction and Specification) includes a general description of the instrument, a safety summary, and the specification.

Section 2 (Operating Instructions) includes information on installation, controls and connectors, and operator familiarization.

## PREFACE (cont)

The Servicing part contains Sections 3 through 9:

Section 3 (Theory of Operation) begins with a general overview of the instrument, followed by a detailed circuit description.

Section 4 (Calibration) includes a Performance Check and an Adjustment Procedure, and an equipment list.

Section 5 (Maintenance) covers the standard electrical and mechanical maintenance; plus any special tools, unusual components, and special handling.

Section 6 (Options) documents any options available with the instrument.

Section 7 (Replaceable Electrical Parts) includes ordering information and part numbers for all replaceable electrical parts.

Section 8 (Diagrams) includes a block diagram, schematics, circuit board illustrations, component basing diagrams, waveforms, parts locating charts, and adjustment location illustrations.

Section 9 (Replaceable Mechanical Parts) refers to an exploded view drawing of the instrument, and lists ordering information for all replaceable mechanical parts.

Change and correction information after the manual has been printed is located behind a tabbed page at the rear of the manual.

The text and diagrams are in accord with, and based on, the following standards of the American National Standards Institute, Inc. (ANSI):

ANSI Y1.1 — 1972, Abbreviations

ANSI Y32.2 — 1975, Graphic Symbols

ANSI Y32.14 — 1973, Graphic Symbols (Logic)

ANSI Y32.16 — 1975, Reference Designators

# TABLE OF CONTENTS

	<b>PAGE</b>
PREFACE . . . . .	i
TABLE OF CONTENTS . . . . .	iii
LIST OF ILLUSTRATIONS . . . . .	xi
LIST OF TABLES. . . . .	xv
OPERATORS SAFETY SUMMARY . . . . .	xvi
SERVICING SAFETY SUMMARY. . . . .	xvii

## PART 1 - OPERATOR'S INFORMATION

### SECTION 1 INTRODUCTION AND SPECIFICATION

INTRODUCTION . . . . .	1-1
SPECIFICATION. . . . .	1-1
Electrical Characteristics . . . . .	1-1
Environmental Characteristics . . . . .	1-10
Physical Characteristics . . . . .	1-10
Standard Accessories List . . . . .	1-18

### SECTION 2 OPERATING INSTRUCTIONS

CONTROLS AND CONNECTORS . . . . .	2-1
USING THE DEMODULATOR . . . . .	2-4
Applying a Signal . . . . .	2-4
Verifying the Demodulator . . . . .	2-4
Monitoring and Rebroadcast . . . . .	2-5
Measuring the Visual Transmitter . . . . .	2-7
Incidental Carrier Phase Modulation . . . . .	2-7
Visual Transmitter Precorrection . . . . .	2-9
Measuring the Aural Transmitter . . . . .	2-11
Applications of the QUASI-PARALLEL Mode . . . . .	2-11
INSTALLATION . . . . .	2-11
Electrical Installation . . . . .	2-11
Down Converter . . . . .	2-11
Power Source . . . . .	2-12
Mains Frequency and Voltage Ranges . . . . .	2-12
Mains Conversion . . . . .	2-12
Remote Connections . . . . .	2-13
Remote Envelope Switch . . . . .	2-13

# TABLE OF CONTENTS (cont)

SECTION 2	OPERATING INSTRUCTIONS (cont)	PAGE
	Remote Carrier-Loss Alarm . . . . .	2-13
	Wiring the REMOTE Connector . . . . .	2-13
	Mechanical Installation . . . . .	2-13
	Latching . . . . .	2-13
	Thumbscrews . . . . .	2-13
	Rackmounting . . . . .	2-14

## PART II - SERVICING INFORMATION

SECTION 3	THEORY OF OPERATION	
	GENERAL CIRCUIT DESCRIPTION . . . . .	3-1
	Introduction . . . . .	3-1
	RF SECTION . . . . .	3-1
	IF SECTION . . . . .	3-1
	First IF . . . . .	3-1
	24 MHz IF . . . . .	3-1
	SAW Filter . . . . .	3-3
	Zero Carrier Switch . . . . .	3-3
	Envelope Detection . . . . .	3-3
	AUDIO SYSTEM . . . . .	3-4
	GAIN CONTROL SYSTEM . . . . .	3-4
	TIMING SECTION . . . . .	3-4
	PHASE LOCK SECTION . . . . .	3-4
	Converter and Reference Local Oscillators . . . . .	3-4
	Limiter . . . . .	3-5
	Phase Shifter . . . . .	3-5
	MECHANICAL DESIGN . . . . .	3-5
	DETAILED CIRCUIT DESCRIPTION . . . . .	3-6
	Introduction . . . . .	3-6
	IF INPUT 1 . . . . .	3-6
	IF Filter Amplifier Board (A20) . . . . .	3-6
	IF Attenuator-Amplifier Board (A21) . . . . .	3-6
	IF MIXER and AURAL DRIVE . . . . .	3-7
	IF Attenuator-Mixer-Filter Board (A22) . . . . .	3-7
	IF Switch-Aural Drive Board (A23) . . . . .	3-8
	IF NYQUIST FILTERING 3 . . . . .	3-9
	IF SAW Amplifier Boards (A24 and A25) . . . . .	3-9
	IF Post Amplifier (A26) . . . . .	3-10

# TABLE OF CONTENTS (cont)

SECTION 3	THEORY OF OPERATION (cont)	PAGE
	IF DETECTION 4. . . . .	3-10
	IF Zero Carrier Switch/Phase Shifter Board (A27) . . . . .	3-10
	IF Detector/Video Amplifier Boards (A28 and A29) . . . . .	3-10
	PIN DRIVERS 5 and 5a . . . . .	3-12
	General . . . . .	3-12
	PROM . . . . .	3-12
	Current Sources . . . . .	3-13
	Q-P FILTER 5b . . . . .	3-14
	Quasi-Parallel (Q-P) Filter Board (A45) . . . . .	3-14
	Q-P Limiter Board (A46) . . . . .	3-14
	AUDIO INPUT 6. . . . .	3-15
	First Audio Mixer Board (A40) . . . . .	3-15
	Second Audio Mixer Board (A41) . . . . .	3-15
	Audio Limiter (A42) . . . . .	3-16
	AUDIO OUTPUT 7 . . . . .	3-16
	Audio Discriminator Board (A43) . . . . .	3-16
	Audio Output Board (A44) . . . . .	3-16
	IF REFERENCE OSCILLATOR and PHASE SHIFTER 8 . . . . .	3-18
	Reference Control Board (A50) . . . . .	3-18
	Reference Oscillator Board (A51) . . . . .	3-18
	Phase Shifter Board (A52) . . . . .	3-19
	CONVERTER PHASE LOCK and DETECTOR LO SWITCH 9 . . . . .	3-19
	Converter Phase Lock Board (A53) . . . . .	3-19
	Detector, Local Oscillator Switch Board (A54) . . . . .	3-22
	CONVERTER LO and LIMITER 10 . . . . .	3-22
	Converter Control Board (A56) . . . . .	3-22
	Converter Oscillator Board (A57) . . . . .	3-22
	Limiter Board (A55) . . . . .	3-23
	AGC SAMPLE AND HOLD and ZERO CARRIER TIMING 11 . . . . .	3-23
	Sync Stripper . . . . .	3-23
	Sample and Hold . . . . .	3-23
	Clock . . . . .	3-23
	Zero Carrier Timing . . . . .	3-24
	Attenuator Control . . . . .	3-25
	AGC A/D CONVERTER and PIN DRIVE DECODER 12 . . . . .	3-25
	Gain Control . . . . .	3-25
	Coarse A/D Converter . . . . .	3-26
	D/A Converter . . . . .	3-27
	PIN Drive Decoder . . . . .	3-27
	Alarm . . . . .	3-27

# TABLE OF CONTENTS (cont)

SECTION 3	THEORY OF OPERATION (cont)	PAGE
	+ 10 V Supply . . . . .	3-28
	READOUT DRIVER 13 . . . . .	3-28
	Clock . . . . .	3-28
	Binary Counters . . . . .	3-28
	Fine A/D Converter . . . . .	3-29
	Offset . . . . .	3-29
	Decimal Counters . . . . .	3-29
	LED Drivers . . . . .	3-29
	POWER SUPPLY 14 . . . . .	3-29
	-15 V Supply . . . . .	3-31
	+ 5 V Supply . . . . .	3-31
	+ 15 V Supply . . . . .	3-31
 SECTION 4	 CALIBRATION	
	Introduction . . . . .	4-1
	Test Equipment Required . . . . .	4-2
	PERFORMANCE CHECK . . . . .	4-6
	1. Check Power Supplies . . . . .	4-6
	2. Check Adjacent Channel Cross-Modulation . . . . .	4-6
	3. Check System AGC and IF Input Level Range . . . . .	4-7
	4. Check Visual IF Range . . . . .	4-7
	5. Check AGC Speed . . . . .	4-7
	6. Check Synchronous Time Constant . . . . .	4-8
	7. Check VIDEO OUTPUT Levels . . . . .	4-10
	8. Check 2T Bar Overshoot . . . . .	4-10
	9. Check Line Time Distortion . . . . .	4-10
	10. Check "K" Factor ( $K_{pb}$ ) Pulse-to-Bar Ratio . . . . .	4-11
	11. Check Field Time Distortion . . . . .	4-11
	12. Check $K_{2T}$ Distortion . . . . .	4-12
	13. Check Chrominance-to-Luminance Delay . . . . .	4-12
	14. Check Line Time Non-Linearity . . . . .	4-13
	15. Check Differential Gain . . . . .	4-13
	16. Check Differential Phase . . . . .	4-14
	17. Check Aural Signal Rejection . . . . .	4-15
	18. Check White Noise Video Signal-to-Noise Ratio . . . . .	4-15
	19. Check Low Frequency Video Signal-to-Noise Ratio . . . . .	4-16
	20. Check Low Frequency Phase Noise . . . . .	4-16
	21. Check Zero Carrier Reference Gate Duration and Cutoff . . . . .	4-16
	22. Check DEVIATION OUT and Audio Levels . . . . .	4-17



# TABLE OF CONTENTS (cont)

SECTION 4	CALIBRATION (cont)	PAGE
	23. Check Frequency Response . . . . .	4-19
	24. Check De-Emphasis Audio Frequency Response . . . . .	4-19
	25. Check Total Harmonic Distortion . . . . .	4-21
	26. Check Signal-to-Noise Ratio . . . . .	4-22
	27. Check Aural Alarm . . . . .	4-22
	28. Check Aural Intercarrier . . . . .	4-22
	29. Check Return Loss . . . . .	4-23
	ADJUSTMENT PROCEDURE . . . . .	4-25
	Short Form Adjustment Procedure . . . . .	4-25
	1. Adjust Power Supply . . . . .	4-26
	2. Adjust AGC Low Pass Filter . . . . .	4-26
	3. Adjust AGC Current . . . . .	4-27
	4. Adjust A/D Cal . . . . .	4-28
	5. Adjust Reference Oscillator . . . . .	4-28
	6. Adjust Converter LO . . . . .	4-28
	7. Adjust Phase Shifter Quadrature . . . . .	4-29
	8. Adjust IF Atten/Amp Bias . . . . .	4-29
	9. Adjust IF Filter . . . . .	4-29
	10. Adjust IF Mixer Filter . . . . .	4-32
	11. Adjust 24 MHz Bandpass Filter . . . . .	4-32
	12. Adjust Video Detector and Quadrature Detector Low Pass Filters . . . . .	4-33
	13. Adjust Video Detector and Quadrature Detector Balance . . . . .	4-34
	14. Adjust IF Mixer Balance . . . . .	4-35
	15. Adjust Video-to-Quadrature Phase . . . . .	4-36
	16. Adjust Quadrature DC Level . . . . .	4-37
	17. Adjust Phase Sampler Balance . . . . .	4-37
	18. Adjust Quadrature Carrier Phase . . . . .	4-37
	19. Adjust Limiter . . . . .	4-38
	20. Adjust IF Delay . . . . .	4-38
	21. Adjust Temperature Tracking Balance . . . . .	4-38
	22. Adjust Narrow Band and Wide Band Linearity . . . . .	4-39
	23. Adjust Overall Flatness . . . . .	4-39
	24. Adjust Switch Current Balance . . . . .	4-39
	25. Adjust Fine AGC . . . . .	4-39
	26. Adjust Video Amp DC Level . . . . .	4-41
	27. Adjust Sync Tip Level . . . . .	4-41
	28. Adjust IF Atten/Amp Gain . . . . .	4-42
	29. Adjust Narrow IF SAW Amp Gain . . . . .	4-42
	30. Adjust IF Post Amp Gain . . . . .	4-42
	31. Adjust Wide IF SAW Amp Gain . . . . .	4-42

# TABLE OF CONTENTS (cont)

<b>SECTION 4</b>	<b>CALIBRATION (cont)</b>	<b>PAGE</b>
	32. Adjust Overall Flatness . . . . .	4-43
	33. Adjust Q-P Filter . . . . .	4-43
	34. Adjust 4.5 MHz Input and Output Bandpass Filters . . . . .	4-43
	35. Adjust 28.5 MHz and Aural Alarm Bandpass Filters . . . . .	4-45
	36. Adjust Amp Bias . . . . .	4-46
	37. Adjust 1 MHz Bandpass Filter . . . . .	4-46
	38. Adjust DEVIATION OUT and Aural Mode Center Frequency . . . . .	4-47
	39. Adjust 600 $\Omega$ Balanced Line Output Level and Narrowband Gain . . . . .	4-48
	40. Adjust Q-P Limiter . . . . .	4-48
	41. Adjust Notch Filter . . . . .	4-49

<b>SECTION 5</b>	<b>MAINTENANCE</b>	<b>PAGE</b>
	Introduction . . . . .	5-1
	PREVENTIVE MAINTENANCE . . . . .	5-1
	Cleaning . . . . .	5-1
	Exterior . . . . .	5-1
	Interior . . . . .	5-1
	Visual Inspection . . . . .	5-1
	Transistor and Integrated Circuit Checks . . . . .	5-1
	Static Sensitive Components . . . . .	5-1
	Performance Checks and Readjustment . . . . .	5-2
	TROUBLESHOOTING . . . . .	5-3
	Troubleshooting Aids . . . . .	5-3
	Foldout Pages . . . . .	5-3
	Diagrams . . . . .	5-3
	Circuit Board Illustrations . . . . .	5-3
	Parts Locating Charts . . . . .	5-4
	Assembly and Circuit Numbering . . . . .	5-4
	Components . . . . .	5-4
	Wire Color Codes . . . . .	5-4
	Connectors . . . . .	5-4
	Resistors . . . . .	5-4
	Capacitors . . . . .	5-6
	Diodes . . . . .	5-6
	Transistors . . . . .	5-6
	Integrated Circuits . . . . .	5-8
	General Troubleshooting Technique . . . . .	5-8
	Troubleshooting Shield Mounted Boards . . . . .	5-8

# TABLE OF CONTENTS (cont)

SECTION 5	MAINTENANCE	PAGE
	Troubleshooting the Power Supply . . . . .	5-9
	CORRECTIVE MAINTENANCE . . . . .	5-9
	Obtaining Replacement Parts . . . . .	5-9
	Nonreplaceable Parts . . . . .	5-9
	PIN Drivers and PIN Attenuators . . . . .	5-9
	Selected Components . . . . .	5-9
	Soldering Chip Components . . . . .	5-10
	TORX® Screws . . . . .	5-10
	Fuse Replacement . . . . .	5-10
	Power Transformer Replacement . . . . .	5-10
	Power Switch Replacement . . . . .	5-10
	Push-Button Switch Replacement . . . . .	5-11
	Indicator Lamp Replacement . . . . .	5-11
	Square Pin Replacement . . . . .	5-11
	Replacing Assemblies . . . . .	5-11
	Replacing the Attenuator (A1) . . . . .	5-11
	Replacing Shield Mounted Boards . . . . .	5-12
	Replacing the IF Interface Board (A32) . . . . .	5-12
	Replacing the Phase Lock Interface Board (A59) . . . . .	5-13
	Replacing the Phase Lock Switch Board (A58) . . . . .	5-14
	Replacing the Readout Driver Board (A61) . . . . .	5-15
	Replacing the Readout Board (A62) . . . . .	5-15
	Replacing the Audio Interface Board (A44) . . . . .	5-16
	Replacing the Power Supply Board (A70) . . . . .	5-16
SECTION 6	OPTIONS	
SECTION 7	REPLACEABLE ELECTRICAL PARTS	
	Parts Ordering Information . . . . .	7-1
	Cross Reference - Manufacturer Code Number-to-Manufacturer . . . . .	7-2
	Replaceable Electrical Parts List. . . . .	7-4

# TABLE OF CONTENTS (cont)

## SECTION 8      DIAGRAMS

BLOCK DIAGRAM  
IF INPUT 1  
IF MIXER & AURAL DRIVE 2  
IF NYQUIST FILTERING 3  
IF DETECTION 4  
PIN DRIVERS 5 and 5a  
Q-P FILTER & Q-P LIMITER 5b  
AUDIO INPUT 6  
AUDIO OUTPUT 7  
IF REFERENCE & PHASE SHIFTER 8  
CONVERTER PHASE LOCK & DETECTOR L.O. SWITCH 9  
CONVERTER L.O. & LIMITER 10  
AGC SAMPLE AND HOLD & ZERO CARRIER TIMING 11  
AGC A/D CONVERTER & PIN DRIVE DECODER 12  
READOUT DRIVER 13  
POWER SUPPLY 14  
FRONT & REAR PANEL 15

## SECTION 9      REPLACEABLE MECHANICAL PARTS

### CHANGE INFORMATION

# LIST OF ILLUSTRATIONS

Fig. No.		Page No.
1-1	1450-1 Television Demodulator . . . . .	xviii
1-2	Amplitude vs. Sideband Frequency Response (RF + IF) . . . . .	1-11
1-3	Envelope Delay vs. Sideband Frequency Response . . . . .	1-11
1-4	Amplitude vs. Baseband Frequency Response . . . . .	1-12
1-5	Video Signal-to-Noise Ratio vs. Input Signal Level . . . . .	1-13
1-6	Synchronous Detector Phase Response . . . . .	1-14
1-7	Notch Filter Characteristics . . . . .	1-15
1-8	Audio De-Emphasis Frequency Response . . . . .	1-16
1-9	Dimensional Drawing . . . . .	1-17
2-1	1450-1 Front-Panel Controls, Connectors, and Indicators . . . . .	2-1
2-2	1450-1 Rear-Panel Controls . . . . .	2-4
2-3	Volts-dBm-Watts Conversion Chart for 50 $\Omega$ Impedance . . . . .	2-5
2-4	1450-1 Response to Typical Test Signals . . . . .	2-6
2-5	Typical Transmitter Measurement Points . . . . .	2-7
2-6	Incidental Carrier Phase Modulation (ICPM) Measurement Setups . . . . .	2-8
2-7	ICPM Example . . . . .	2-10
2-8	Effect of Low Pass Filters on ICPM Measurement . . . . .	2-10
2-9	External Phase Graticule for 1480 Waveform Monitor . . . . .	2-10
2-10	Changing Mains Voltage . . . . .	2-12
2-11	REMOTE Connector Wiring . . . . .	2-13
2-12	Exploded View of REMOTE Connector . . . . .	2-13
2-13	Rackmount Hole Spacing . . . . .	2-14
2-14	Spring Latch Catch . . . . .	2-14
2-15	Rackmounting Hardware . . . . .	2-15
2-16	Mounting Stationary Rackmount Sections . . . . .	2-16
3-1	1450-1 Simplified Block Diagram . . . . .	3-2
3-2	Equivalent Circuit of Bridged Tee PIN Attenuator . . . . .	3-6
3-3	Diode Ring Mixer Operation . . . . .	3-8
3-4	Typical Bandpass Characteristics of the SAW Filters . . . . .	3-9
3-5	Internal Schematic of the Balanced Demodulator IC as Used in the Video and Quadrature Detectors . . . . .	3-11
3-6	Relationship of the Video and Quadrature Outputs . . . . .	3-12
3-7	PIN Driver Block Diagram . . . . .	3-13
3-8	Simplified Schematic of PIN Driver Current Sources . . . . .	3-14
3-9	Waveforms Associated with the Pulse Count Discriminator . . . . .	3-16

# LIST OF ILLUSTRATIONS (cont.)

Fig. No.		Page No.
3-10	Relationship of U22 (A52) Output Voltage and Phase of Local Synchronous Signal at Summing Network Output . . . . .	3-20
3-11	Zero Carrier Timing Diagram . . . . .	3-24
3-12	Truth Table for U34 at A60 . . . . .	3-24
3-13	Waveforms for Understanding the AGC A/D Converter Operation . . . . .	3-26
3-14	PIN Driver Decoder Data . . . . .	3-28
3-15	Timing Diagram for Divide by Seven Counter, U81 on A61 . . . . .	3-29
3-16	Readout Offsets . . . . .	3-30
4-1	600 $\Omega$ Matching Switch . . . . .	4-5
4-2	8 $\Omega$ -to-600 $\Omega$ Matching Coupler . . . . .	4-5
4-3	130 kHz Noise Filter . . . . .	4-5
4-4	Test Jumper . . . . .	4-5
4-5	R1000 Test Fixture . . . . .	4-5
4-6	Video Low Pass Filter . . . . .	4-5
4-7	Setup for Checking Adjacent Channel Cross-Modulation . . . . .	4-6
4-8	Setup for Checking AGC Speed . . . . .	4-8
4-9	Setup for Checking Synchronous Time Constant . . . . .	4-8
4-10	Correct Waveforms When Checking Synchronous Time Constant . . . . .	4-9
4-11	Setup for Checking Video Levels . . . . .	4-10
4-12	Setup for Checking 2T Bar Overshoot . . . . .	4-11
4-13	Typical Graticule 'B' Display . . . . .	4-12
4-14	Typical Display When Checking Chrominance-to-Luminance Delay . . . . .	4-12
4-15	Setup for Checking Source Line Time Non-linearity . . . . .	4-13
4-16	Typical Display When Checking Line Time Non-linearity . . . . .	4-13
4-17	Setup for Checking Line Time Non-linearity . . . . .	4-13
4-18	Setup for Checking Differential Gain . . . . .	4-14
4-19	Typical Display When Checking Differential Gain . . . . .	4-14
4-20	Setup for Checking Differential Phase . . . . .	4-14
4-21	Typical Display When Checking Differential Phase . . . . .	4-15
4-22	Aural Carrier 4 dB Below Unmodulated Visual Carrier . . . . .	4-15
4-23	Setup for Checking White Noise Signal-to-Noise Ratio . . . . .	4-15
4-24	Setup for Checking Low Frequency Phase Noise . . . . .	4-16
4-25	Setup for Checking External Zero Carrier Reference Gate . . . . .	4-17
4-26	Typical Display of Video Signal . . . . .	4-17
4-27	Attenuated Video Signal . . . . .	4-17
4-28	Setup for Obtaining 25 kHz Deviation (1 <sup>st</sup> Carrier Null) . . . . .	4-18
4-29	Aural Carrier 4 dB Below Unmodulated Visual Carrier . . . . .	4-18
4-30	1 <sup>st</sup> Carrier Null (25 kHz Deviation). . . . .	4-18

# LIST OF ILLUSTRATIONS (cont.)

Fig. No.		Page No.
4-31	Setup for Characterizing the Tracking Generator and Audio Spectrum Analyzer . . . . .	4-19
4-32	Setup for Checking Wideband Flatness . . . . .	4-20
4-33	Typical Display When Checking Wideband Flatness . . . . .	4-20
4-34	Setup for Checking Audio De-Emphasis Frequency Response . . . . .	4-21
4-35	Setup for Checking Aural Intercarrier . . . . .	4-23
4-36	Setup for Checking High Frequency Return Loss . . . . .	4-23
4-37	Setup for Checking Return Loss . . . . .	4-24
4-38	AGC Current Adjustment (LSBs) . . . . .	4-27
4-39	AGC Current Adjustment . . . . .	4-28
4-40	Setup for Adjusting Bias . . . . .	4-30
4-41	Setup for Adjusting IF, IF Mixer, and 24 MHz Filters . . . . .	4-31
4-42	IF Trap Waveform . . . . .	4-31
4-43	Setup for Adjusting Low Pass Filters . . . . .	4-33
4-44	Preliminary Waveform When Adjusting Low Pass Filters . . . . .	4-33
4-45	Typical Display When Adjusting Low Pass Filters . . . . .	4-34
4-46	Setup for Adjusting Detector Balance . . . . .	4-34
4-47	Typical Display When Adjusting Detector Balance . . . . .	4-35
4-48	Setup for Adjusting IF Mixer Balance . . . . .	4-36
4-49	Typical Display When Adjusting IF Mixer Balance . . . . .	4-35
4-50	Setup for Adjusting Video-to-Quadrature Phase . . . . .	4-37
4-51	Vertical Phase Display . . . . .	4-37
4-52	Setup for Adjusting Quadrature Carrier Phase . . . . .	4-38
4-53	Setup for Adjusting Linearity and Flatness . . . . .	4-39
4-54	Typical Display When Adjusting Narrow and Wideband Linearity . . . . .	4-40
4-55	Setup for Adjusting Switch Current Balance . . . . .	4-41
4-56	Setup for Adjusting Video Levels . . . . .	4-41
4-57	Setup for Adjusting Q-P Filter . . . . .	4-43
4-58	Typical Display When Adjusting Q-P Filter . . . . .	4-44
4-59	4.5 MHz Bandpass Filter . . . . .	4-44
4-60	Setup for Obtaining 25 kHz Deviation (1 <sup>st</sup> Carrier Null) . . . . .	4-45
4-61	Aural Carrier 4 dB Below Unmodulated Visual Carrier . . . . .	4-45
4-62	1 <sup>st</sup> Carrier Null (25 kHz Deviation) . . . . .	4-45
4-63	Typical Display When Adjusting Output Amplifier Bias . . . . .	4-46
4-64	Setup for Adjusting 1 MHz Bandpass Filter . . . . .	4-46
4-65	Typical Display When Adjusting 1 MHz Bandpass Filter (DEVIATION OUT) . . . . .	4-47
4-66	Setup for Adjusting Q-P Limiter . . . . .	4-48
4-67	Minimal Video Products . . . . .	4-49
4-68	Setup for Adjusting Notch Filter . . . . .	4-49

## LIST OF ILLUSTRATIONS (cont.)

Fig. No.		Page No.
5-1	Using the Foldout Pages . . . . .	5-3
5-2	Assembly Locations . . . . .	5-5
5-3	Multipin Intercircuit Connectors . . . . .	5-6
5-4	Semiconductor Lead Identification . . . . .	5-7
5-5	Troubleshooting Shield-Mounted Boards . . . . .	5-8
5-6	Soldering Chip Components . . . . .	5-10
5-7	Replacing Push-Button Switches . . . . .	5-11
5-8	Indicator Lamp Replacement . . . . .	5-11
5-9	Circuit Board Extracting Tool and Extender Board . . . . .	5-12
5-10	Replacing the IF Interface Board (A32) . . . . .	5-12
5-11	Replacing the Phase Lock Interface Board (A59) . . . . .	5-13
5-12	Replacing the Phase Lock Switch Board (A58) . . . . .	5-14
5-13	Replacing the Readout Driver Board (A61) . . . . .	5-15
5-14	Replacing the Readout Board (A62) . . . . .	5-15
5-15	Replacing the AGC Control Board (A60) . . . . .	5-16
5-16	Replacing the Audio Interface Board (A40) . . . . .	5-17
5-17	Replacing the Power Supply Board (A70) . . . . .	5-18
5-18	Repackaging Instructions . . . . .	5-19



# LIST OF TABLES

Table No.		Page No.
1-1	Electrical Characteristics . . . . .	1-1
1-2	Environmental Characteristics . . . . .	1-10
1-3	Physical Characteristics . . . . .	1-10
1-4	1450-1 Standard Accessories List . . . . .	1-18
4-1	Recommended Test Equipment . . . . .	4-1
4-2	Line Voltage Ranges . . . . .	4-6
4-3	Adjacent Channel Frequencies . . . . .	4-7
4-4	Total Harmonic Distortion Calculations. . . . .	4-22
4-5	Converter L.O. Frequency . . . . .	4-29
5-1	Relative Susceptibility to Static Discharge Damage . . . . .	5-2
5-2	Wire Color Codes . . . . .	5-4
5-3	Selected Components . . . . .	5-9
6-1	Visual IF Options . . . . .	6-1

# OPERATOR'S SAFETY SUMMARY

The general safety information in this part of the summary is for both operating and servicing personnel. Specific warnings and cautions will be found throughout the manual where they apply, but may not appear in this summary.

## TERMS

### In This Manual

CAUTION statements identify conditions or practices that could result in damage to the equipment or other property.

WARNING statements identify conditions or practices that could result in personal injury or loss of life.

### As Marked on Equipment

CAUTION indicates a personal injury hazard not immediately accessible as one reads the marking, or a hazard to property including the equipment itself.

DANGER indicates a personal injury hazard immediately accessible as one reads the marking.

## SAFETY CONSIDERATIONS

### Power Source

This product is intended to operate from a power source that will not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

### Grounding the Product

This product is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting to the product input or output terminals. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.

### Use the Proper Power Cord

Use only the power cord and connector specified for your product.

Use only a power cord that is in good condition.

Refer cord and connector changes to qualified service personnel.

**Use the Proper Fuse**

To avoid fire hazard, use only the fuse of correct type, voltage rating and current rating as specified in the part list for your product.

Refer fuse replacement to qualified service personnel.

**Do Not Operate in Explosive Atmospheres**

To avoid explosion, do not operate this product in an explosive atmosphere unless it has been specifically certified for such operation.

**Do Not Remove Covers or Panels**

To avoid personal injury, do not remove the product covers or panels. Do not operate the product without the covers and panels properly installed.

## **SERVICING SAFETY SUMMARY**

### **FOR QUALIFIED SERVICE PERSONNEL ONLY**

*Refer also to the preceding Operators Safety Summary.*

**Do Not Service Alone**

Do not perform internal service or adjustment of this product unless another person capable of rendering first aid and resuscitation is present.

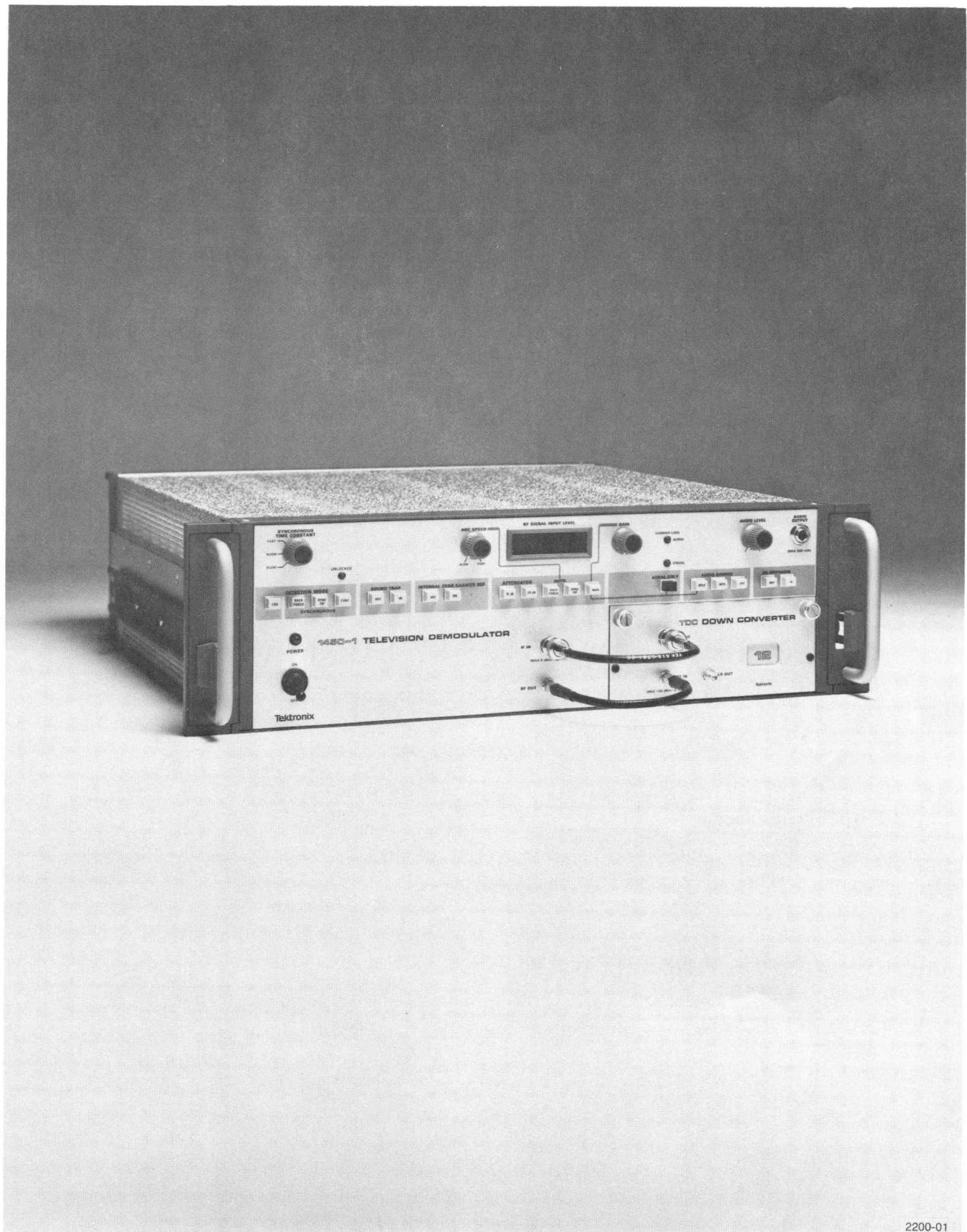
**Use Care When Servicing With Power On**

Dangerous voltages exist at several points in this product. To avoid personal injury, do not touch exposed connections and components while power is on.

Disconnect power before removing protective panels, soldering, or replacing components.

**Power Source**

This product is intended to operate from a power source that will not apply more than 250 volts rms between the supply conductors or between either supply conductor and ground. A protective ground connection by way of the grounding conductor in the power cord is essential for safe operation.



2200-01

Fig. 1-1. 1450-1 Television Demodulator

# INTRODUCTION AND SPECIFICATION

## INTRODUCTION

The 1450-1 is a precision television demodulator. The RF section is easily interchangeable and can be ordered for any channel. The IF section uses Surface Acoustic Wave (SAW) filters for a precise Nyquist slope and exceptional stability. The stability means that very little maintenance or recalibration is required.

Both synchronous and envelope detection is used in the 1450-1. The synchronous detection mode eliminates quadrature distortion so that the

transmitter output can be compared with the video input signal. The envelope detection mode is used in conjunction with synchronous detection to assess how a home receiver is affected by certain transmitter distortions. A quadrature output from the synchronous detector is provided for measuring transmitter incidental phase. When used with the video output, a vector display of the RF signal can be produced on an XY monitor or a 1480 Waveform Monitor with an external phase graticule.

The 1450-1 has a high dynamic range, allowing a low-sensitivity input for a signal directly out of a transmitter, and a high sensitivity for a distant signal. An LED readout indicates the input power level in dBm.

Visual and Aural Carrier Loss alarm lights are included on the front panel.

These LEDs light with a loss of either carrier. A set of relay contacts are available at the rear panel REMOTE connector to drive an external alarm circuit. The relay switches when either of the alarm lights activate, and when instrument power is lost.

Split, Intercarrier, and Quasi-Parallel sound detection methods are included in the 1450-1. Split is used to accurately measure the aural transmitter. The Intercarrier mode is used to help determine the effects of picture carrier FM noise on the sound signal. Quasi-Parallel detection substantially reduces the buzz that might otherwise be introduced on the detected signal due to the IF signal passing through the vestigial sideband filter of the demodulator when the Intercarrier detection mode is used.

The audio section has three audio outputs and a calibrated deviation output voltage. These outputs are used for monitoring and measuring parameters of the aural transmitter.

A zero-carrier reference pulse is generated internally, or the 1450-1 can be driven by an external source (i.e., a TEKTRONIX 1440). This pulse establishes a reference for measuring modulation depth.

**Table 1-1**  
**ELECTRICAL CHARACTERISTICS**

Characteristics	Performance Requirement	Supplemental Information
<b>RF</b> <b>System</b> RF Attenuator Range	30 dB in 10 dB steps.	System specifications are for the 1450-1 with a TDC Down Converter. Calibration procedures for these specifications are located in the down converter manual. Input level range shifts with attenuation: -59 dBm to + 7 dBm with 10 dB attenuation; -49 dBm to + 17 dBm with 20 dB attenuation; -39 dBm to + 27 dBm with 30 dB attenuation.
Noise Figure		
VHF	10 dB or less.	
UHF	11 dB or less.	
AGC Range	66 dB.	
Adjacent Channel Cross-modulation	60 dB or greater down.	Adjacent channel signal less than or equal to the desired channel signal.
Second Adjacent Channel Cross-modulation	60 dB or greater down.	Second adjacent channel signal less than or equal to the desired channel signal.
Amplitude Vs. Sideband Freq. Response	See Fig. 1-2.	
Envelope Delay Vs. Sideband Freq. Response	See Fig. 1-3.	
Amplitude Vs. Baseband Freq. Response	See Fig. 1-4.	

Table 1-1 (cont.)

Characteristics	Performance Requirement	Supplemental Information
Variation in System Freq. Response with AGC		
VHF	$\pm 0.1$ dB or less.	Tested over entire AGC range.
UHF	$\pm 0.15$ dB or less.	Tested over entire AGC range.
Chrominance/Aural Carrier/Visual Carrier Intermodulation	50 dB or greater down.	Three-tone test. P-p video/p-p 920 kHz.
Readout Accuracy	$\pm 2$ dB.	
Readout Resolution	$\pm 0.1$ dB.	
<b>MAINFRAME</b>		
RF INput Connector		50 $\Omega$ N (rear panel).
RF OUTput Connector		50 $\Omega$ SMA (front panel).
<b>IF</b>		
IF INput		From 50 $\Omega$ source.
Z <sub>in</sub> & Connector		50 $\Omega$ bnc (front panel).
Return Loss	18 dB or greater (over IF passband).	At least 26 dB with 6 dB or greater pad.
Level Range	-20 dBm to -64 dBm.	Signal-to-noise ratio deteriorates as signal decreases.
Frequency		
Visual IF		
Option 1	37.0 MHz $\pm$ 120 kHz.	
Option 2	38.9 MHz $\pm$ 120 kHz.	
Option 3	45.75 MHz $\pm$ 120 kHz.	
Aural IF	4.5 MHz below the visual IF.	
Variation in Mainframe Freq. Response as a Function of AGC	$\pm 0.05$ dB or less.	

Table 1-1 (cont.)

Characteristics	Performance Requirements	Supplemental Information
<b>VIDEO</b>		
VIDEO OUTPUT		
$Z_0$ and Connector		75 $\Omega$ bnc (2 rear-panel outputs).
Return Loss	34 dB or greater from 0 to 6 MHz.	
Video Level		Typically 1 V p-p (Sync-tip) to peak white at standard modulation percentages.
DC Level		
Blanking Level	0 V $\pm$ 50 mV.	In back-porch AGC.
Sync Tip	Blanking level -286 mV $\pm$ 5.7 mV.	In sync-tip AGC with blanking level measured in back-porch AGC.
Levels Relative to Zero Carrier		
Blanking Level	Zero Carrier -857 mV $\pm$ 17 mV.	In back-porch AGC.
Sync Tip	Zero Carrier -1143 mV $\pm$ 22 mV.	In sync-tip AGC.
Linear Distortions		
2T Bar Overshoot	1% or less.	
Line Time		
Wideband Synchronous	0.5% 'k' or less.	
All other modes	1% 'k' or less.	
$K_{pb}$	0.5% 'k' or less.	Synchronous Detection Wideband only.
$K_{2t}$	0.5% 'k' or less.	Synchronous Detection Wideband only.
Field Time	0.5% 'k' or less.	
Chrominance-to-Luminance Delay	$\pm$ 20 ns or less.	



Table 1-1 (cont.)

Characteristics	Performance Requirements	Supplemental Information
Non-Linear Distortions		
Line Time Non-Linearity	1% or less.	
Differential Gain		
Synchronous	1% or less.	
Envelope	4% or less.	
Differential Phase	1° or less.	
Aural Signal Rejection	46 dB or greater	4.5 MHz p-p/blanking-to-reference white picture signal (100 IRE).
Video Signal-to-Noise Ratios		
Low Frequency	60 dB or greater.	P-p video/p-p mains ripple.
Mid-Frequency Coherent	50 dB or greater.	P-p video/p-p noise.
White Noise	60 dB or greater with at least -25 dBm of input signal.	P-p video/rms white noise (10 kHz to 5 MHz). (Decreases with input signal. See Fig. 1-5.)
QUADRATURE OUTput		
Z <sub>0</sub> and Connector		75Ω bnc (rear panel).
Return Loss	34 dB or greater from 0 to 6 MHz.	
Quadrature Phase with Respect to Video Out	90° + 2°.	Up to 250 kHz.
Synchronous Detection Phase Angle	± 3°.	Up to 250 kHz.
Low-Frequency Phase Noise	0.25° rms or less.	With SYNCHRONOUS TIME CONSTANT switch set to SLOW.
Synchronous Detector Phase Response		See Fig. 1-6.
Zero Carrier Reference Gate		
Carrier Cutoff	50 dB or greater.	Zero Carrier ± 0.5 IRE.

Table 1-1 (cont.)

Characteristics	Performance Requirement	Supplemental Information
Width	$30 \mu\text{s} \pm 10\%$	
Delay		Typically $20 \mu\text{s} \pm 10\%$ from leading edge of sync.
Timing	Factory set to line 20 of both fields.	Internally selectable from lines 10 through 25 of both fields.
Ext ZERO CARRIER REFERENCE DRIVE INPUT  $Z_{in}$ and Connector		Approximately $5 \text{ k}\Omega$ bnc (rear panel).
Level Required		Approximately +1 V. Accepts input from TEKTRONIX 1440 set for positive output.
<b>AUDIO</b>		
Audio Characteristics		
Frequency Response		
Audio Out  600 $\Omega$ Balanced Line & Deviation Out (75 $\Omega$ ) With Wide Bandwidth Internally Selected	$\pm 0.1 \text{ dB}$ $\pm 0.5 \text{ dB}$	30 Hz to 50 kHz. 30 Hz to 150 kHz.
600 $\Omega$ Balanced Line With Narrow Bandwidth Internally Selected	$\pm 0.4 \text{ dB}$	30 Hz to 20 kHz.
8 $\Omega$ Speaker & Phono Jack	$\pm 0.4 \text{ dB}$	30 Hz to 20 kHz. A notch 15.734 kHz filter with nominal characteristics given in Fig. 1-7, can be inserted into this output line by moving an internal jumper.
De-emphasis In	$\pm 0.5 \text{ dB}$ from 75 $\mu\text{s}$ de-emphasis curve (see Fig. 1-8).	30 Hz to 20 kHz.

Table 1-1 (cont.)

Characteristics	Performance Requirement	Supplemental Information
Total Harmonic Distortion		Measured at 25 kHz peak deviation.
	0.10%.	For aural baseband signals in the band 30 Hz to 15 kHz measured in the band 30 Hz to 50 kHz.
	0.5%	For aural baseband signals in the band 16.5 kHz to 50 kHz measured in the band 50 to 120 kHz.
Signal-to-Noise Ratio 130 kHz Bandwidth	50 dB or greater in all modes.	25 kHz deviation Reference. Measured at the DEVIATION OUT (no De-emphasis and no modulation of the vision carrier).
50 kHz Signal-to-Noise Ratio		Typically 60 dB in all modes. 25 kHz deviation Reference. Measured at the DEVIATION OUT (no De-emphasis and no modulation of the vision carrier).
Intermodulation Distortion		Typically 0.1%. At 25 kHz peak deviation using SMPTE test with 60 Hz and 7 kHz in a 4:1 mix.
Baseband Phase Linearity		50 Hz to 50 kHz.
Audio Out 600 $\Omega$ Balanced Line & Deviation Out (75 $\Omega$ )		Typically within 0.5° from best straight line fit.
DEVIATION OUTput $Z_0$ and Connector		75 $\Omega$ bnc (rear panel).
Level	10 $\pm$ 0.1 mV/kHz deviation.	$\pm$ 25 kHz deviation produces a 0.50 V p-p output into 75 $\Omega$ .
AURAL INTERCARRIER IN $Z_{in}$ & Connector		50 $\Omega$ bnc (rear panel).
Return Loss	20 dB or greater.	
Input Level		-30 dBm $\pm$ 5 dB.
Input Frequency		4.5 MHz $\pm$ 1 kHz.

Table 1-1 (cont.)

Characteristics	Performance Requirement	Supplemental Information
AURAL INTERCARRIER OUT  Z <sub>0</sub> & Connector		50Ω bnc (rear panel).
Return Loss	20 dB or greater.	
Level		Nominal -6 dBm up to 0 dBm (depends on Aural/Visual ratio).
AUDIO OUTput 600Ω Balanced Line  Level (with wide bandwidth internally selected)	50 ± 1.5 mV/kHz deviation.	
(With narrow bandwidth internally selected)	10 ± 1 dBm at 25 kHz deviation.	
Connector		XLR male (rear panel) 600Ω balanced.
8Ω SPEAKER Output  Level	At least 5W.	Front-panel adjustable.
Connector		Barrier block (rear panel).
Headphone OUTPUT  Level	At least 50 mW.	Front-panel adjustable.
Connector		Phone jack (front panel). Monaural output only. Accepts mono or stereo style phones.
<b>CONNECTIONS</b>  REMOTE Connector  Alarm Output		SPDT relay contacts rated at 28 V, 3 A maximum. Pins 8 and 9 close for alarm or loss of power. Pins 7 and 8 open for alarm or loss of power.

Table 1-1 (cont.)

Characteristics	Performance Requirement	Supplemental Information
External Synchronous/ Envelope Switch		Ground pin 6 for envelope detection (front-panel switches in desired Synchronous mode).
Damage Level at RF Input	1 W maximum.	At any attenuator setting.
<b>POWER SUPPLY</b> Power-Supply Characteristics		
Mains		
Power	100 W maximum.	90 W nominal.
Voltage Range		
115 V Low	90 V to 110 V.	
115 V High	108 V to 132 V.	
230 V Low	198 V to 242 V.	
230 V High	216 V to 250 V.	
Fuse Data		
115 V		1.25 A Slo-Blo.
230 V		0.6 A Medium-Blo.
Line Voltage Frequency	48 to 62 Hz.	
Line Voltage Crest Factor		At least 1.3 (peak/rms).

Characteristics	Information
<b>SAFETY</b>	Designed to meet or exceed: UL -1244, Second Edition Factory Mutual - 3820 CSA Bulletin 556B IEC 348, Second Edition FCC EMI Compatibility (FCC Rules, Part 15, Subpart J, Class A) VDE 0871.5 (Class B)

**Table 1-2**  
**ENVIRONMENTAL CHARACTERISTICS**

Characteristics	Information
Temperature	
Operating	0°C to 50°C.
Storage	-40°C to + 65°C.
Altitude	
Operating	To 15,000 feet.
Storage	To 50,000 feet.

**Table 1-3**  
**PHYSICAL CHARACTERISTICS**

Characteristics	Information
Dimensions	See Fig. 1-9.
Length	19 1/8" (48.58 cm)
Width	19" (48.26 cm)
Height	5 1/4" (13.34 cm)
Weight	36 lbs (16.33 kg)

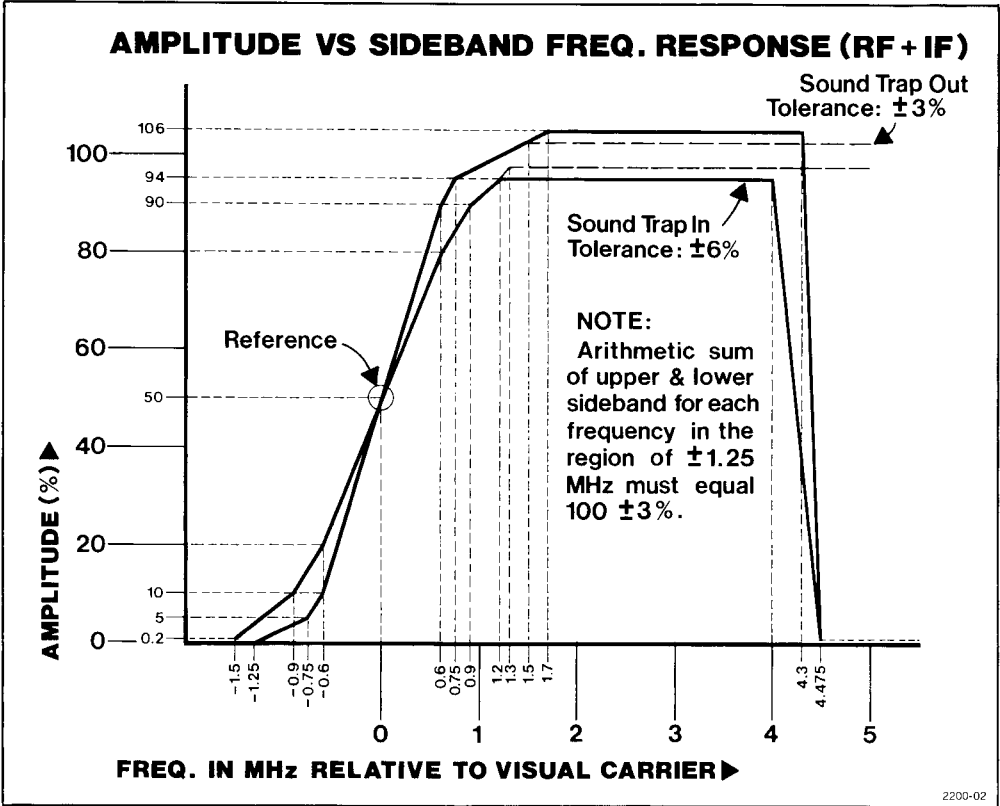


Fig. 1-2. Amplitude versus Sideband Frequency Response (RF + IF).

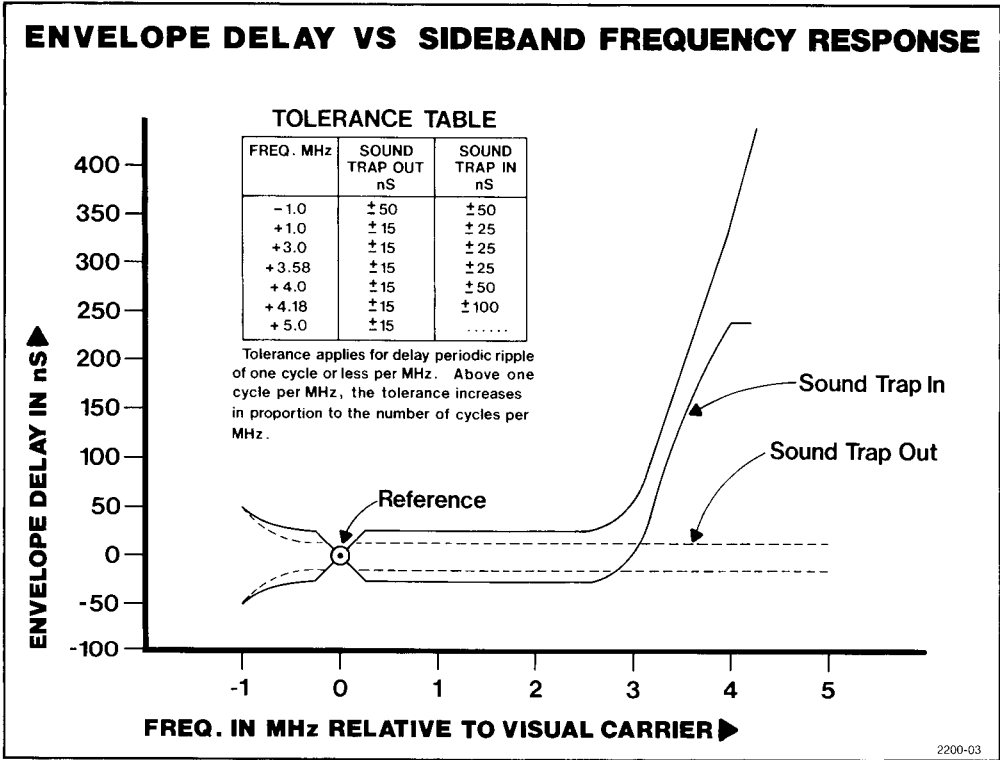


Fig. 1-3. Envelope Delay versus Sideband Frequency Response.

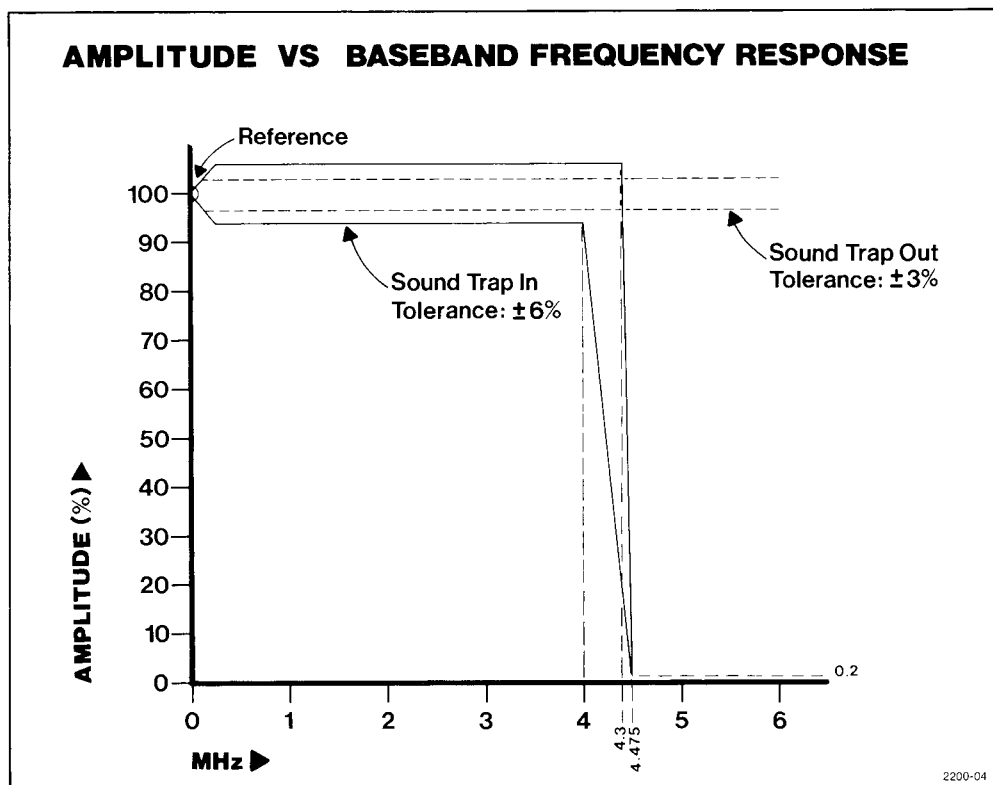


Fig. 1-4. Amplitude versus Baseband Frequency Response.



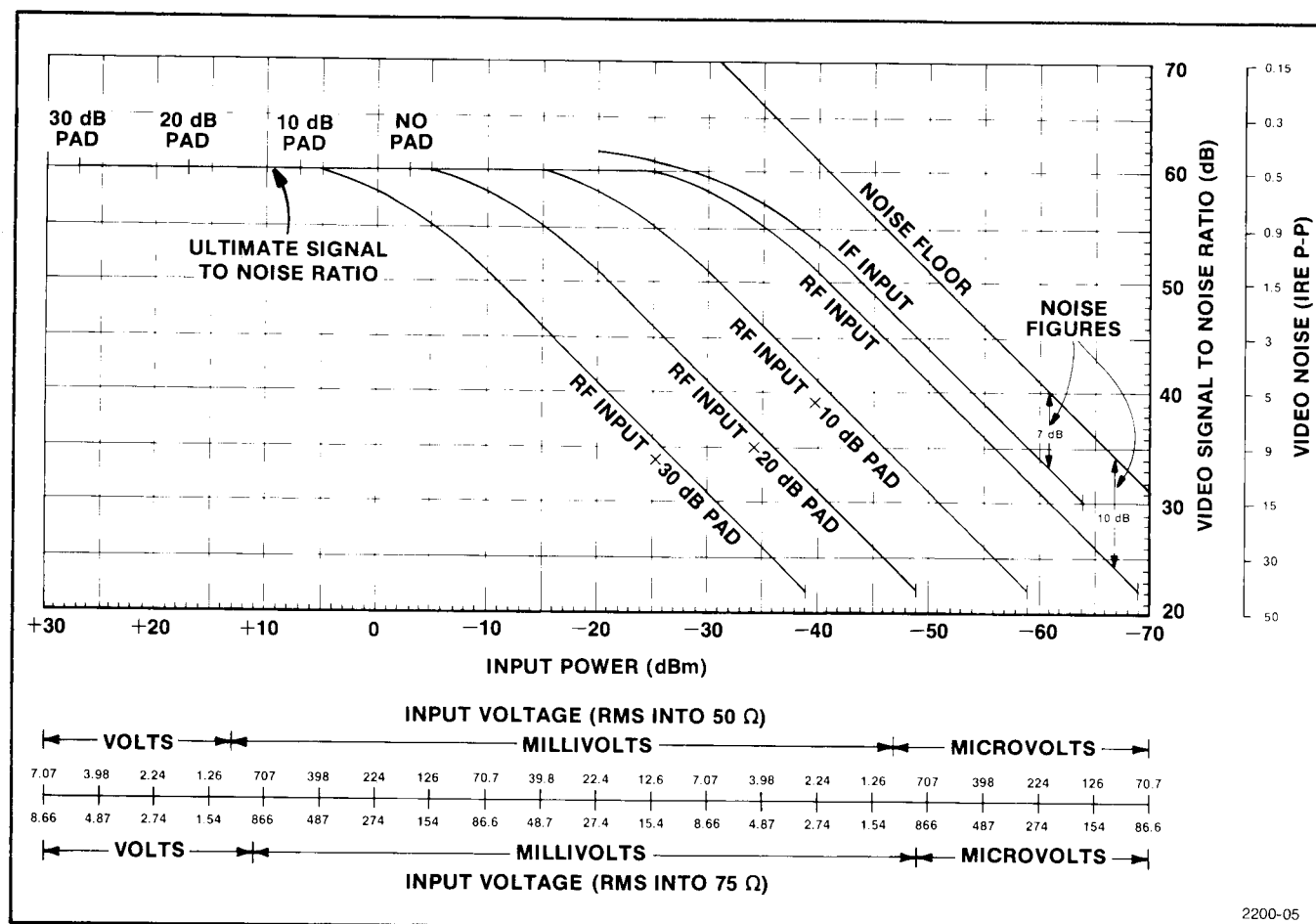


Fig. 1-5. Video Signal-to-Noise Ratio versus Input Signal Level.

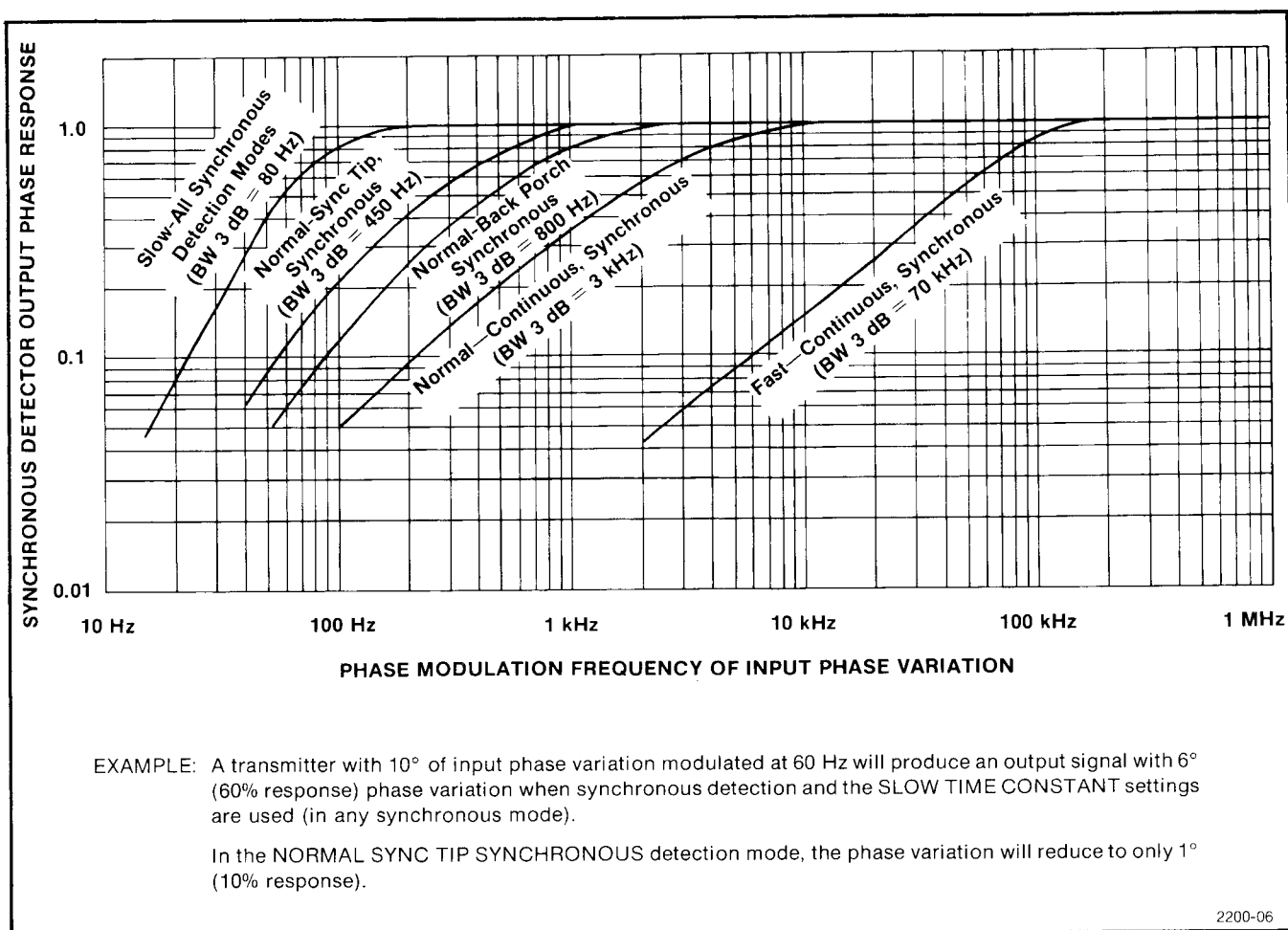


Fig. 1-6. Synchronous Detector Phase Response.

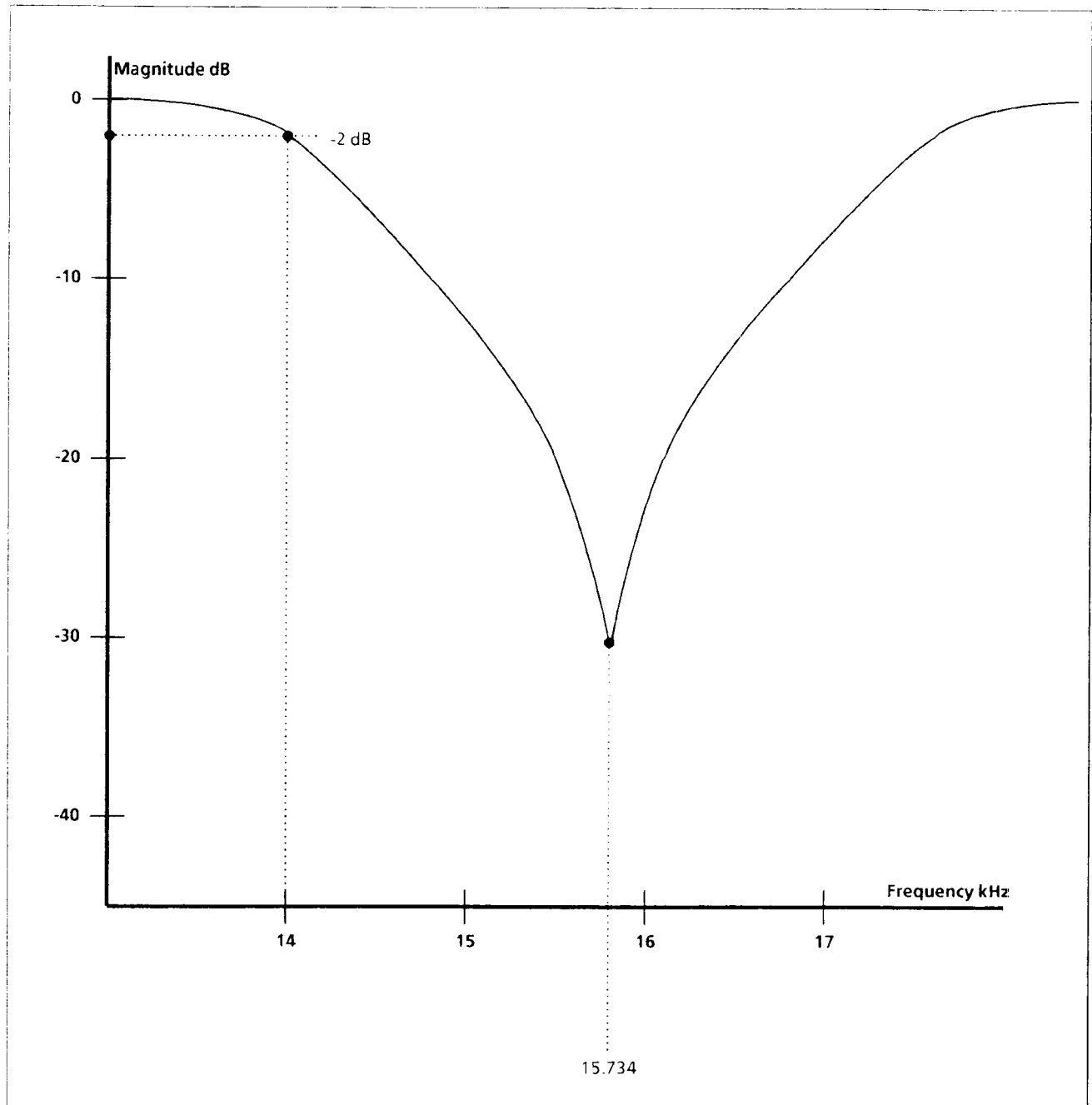


Fig. 1-7. Characteristics of the Notch Filter.

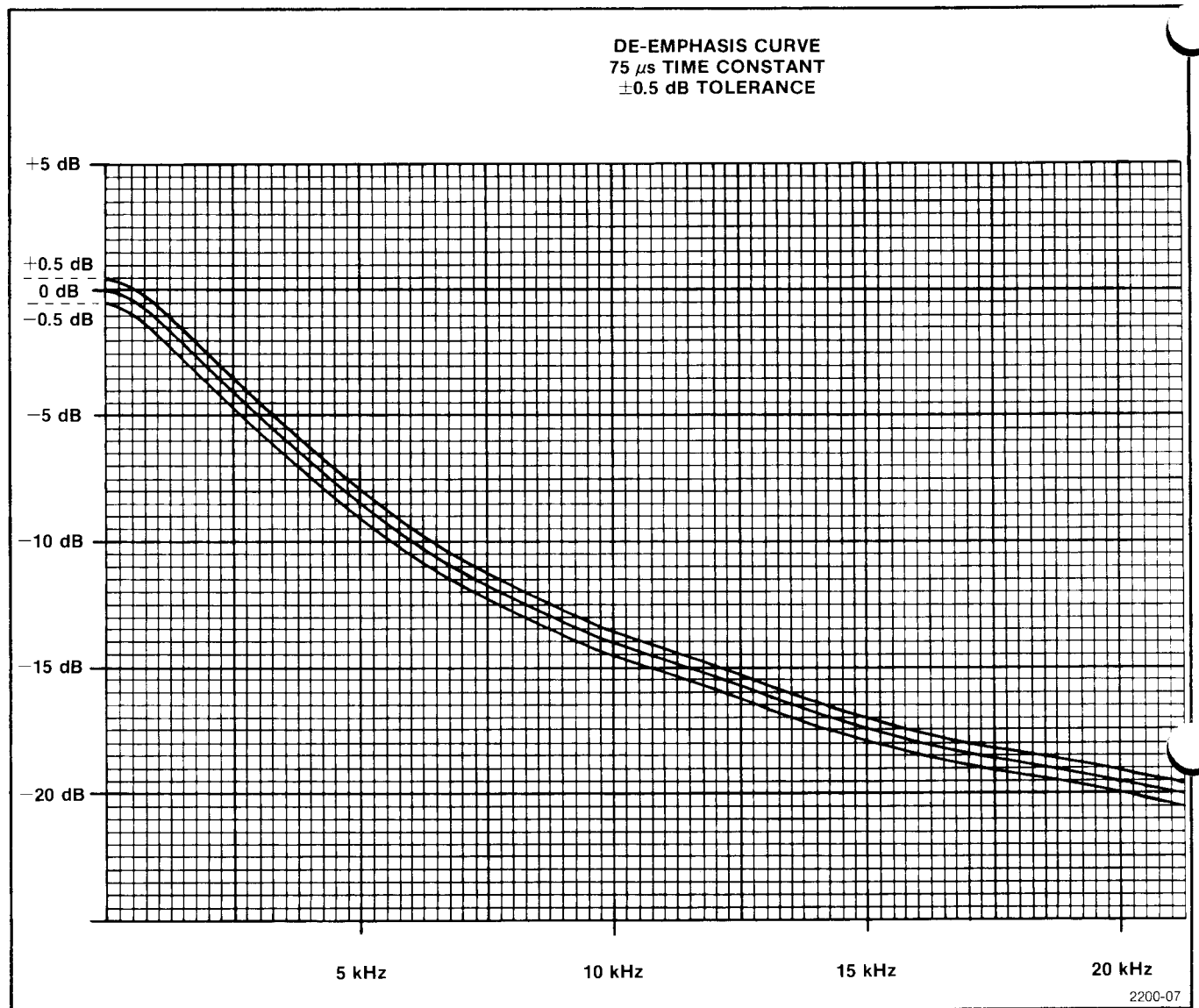


Fig. 1-8. Audio De-emphasis Frequency Response.

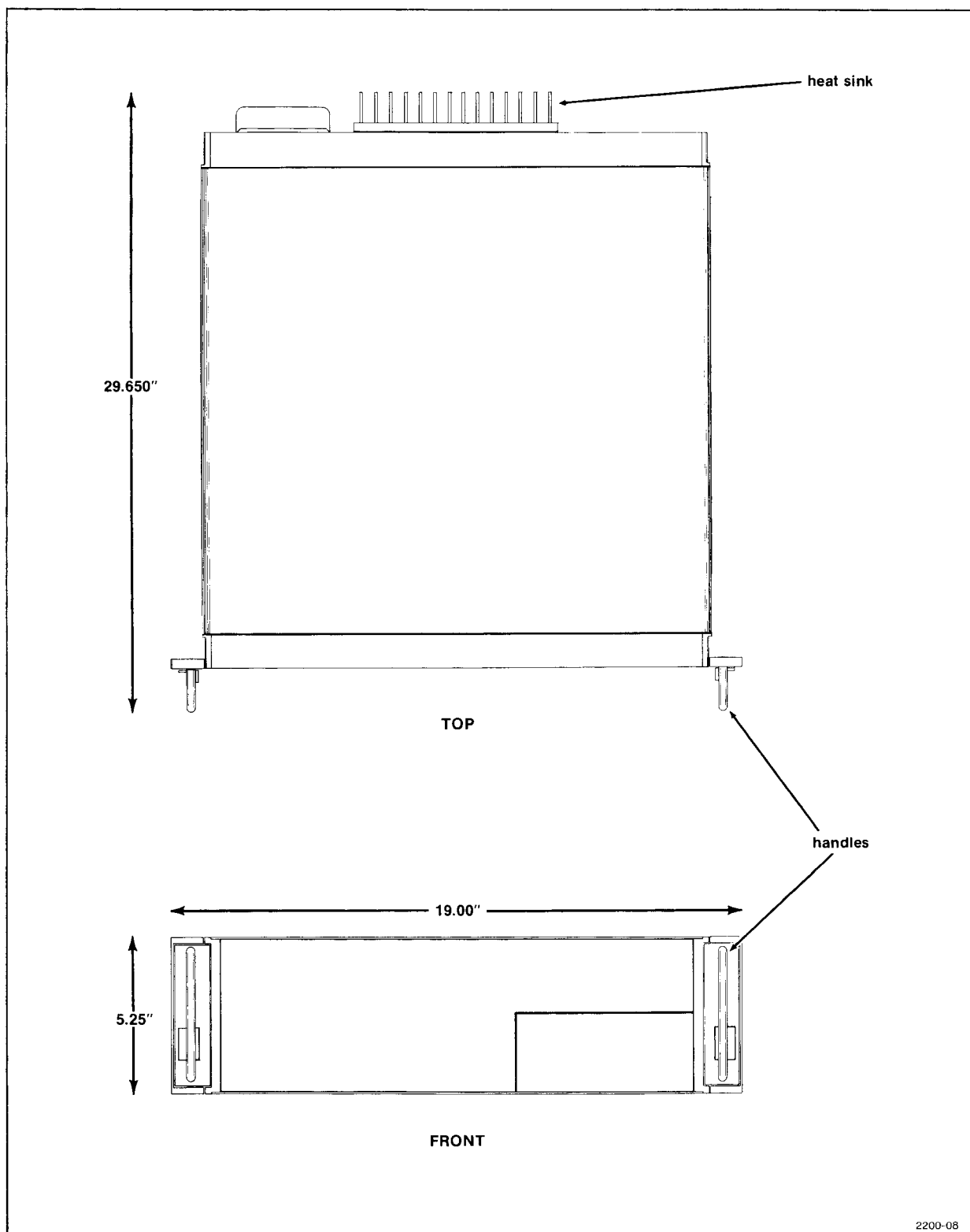


Fig. 1-9. Dimensional Drawing

**Table 1-4**  
**Standard Accessories List**

Quantity	Item	Tektronix Part No.
1	Power Cables; 8 ft. long	161-0066-00
1	Rackmount Slide Guide (Pair)  Up to Serial Number B010199 Serial Number B010199 and Up	351-0487-00 351-0301-01
1	Instruction Manual	070-5568-00
1	N to BNC Adapter	103-0045-00
1	Extender ECB	670-5034-00
1	Remote Connector Assembly:  Male Connector Hood Screw (2 each)	131-1007-00 200-1170-00 213-0260-00
1	50Ω Coaxial Cable with BNC Connectors	012-0751-00
1	50Ω Double-Shielded Coaxial Cable with SMA Connectors.	012-0752-00
2	BNC to Square-Pin Adapter Cables	175-2140-00
1	BNC to Peltola Adapter Cable	067-0709-00
1	TORX® Screwdriver Bit	003-0816-00
1	0.6 A Medium-Blo Fuse for 230 V Range	159-0043-00
1	External Phase Graticule	331-0393-12
1	250 kHz Low Pass Filter	015-0352-00

# OPERATING INSTRUCTIONS

This section includes information on the function of the controls, connectors, and indicators; how to use the demodulator; and installation procedures.

## Controls and Connectors

### FRONT PANEL (See Fig. 2-1)

1. **POWER** – Turns the instrument power on and off. Power 'on' is indicated by a green LED.

**DETECTION MODE** – These self-cancelling push buttons determine the type of detection used.

2. **ENV** – Selects the Envelope detection mode. This mode is used in conjunction with the Synchronous detector to measure transmitter distortions caused

by incidental phase. Envelope detection is not recommended for normal use because it introduces quadrature distortion into the signal.

**SYNCHRONOUS** – Selects the Synchronous detection modes.

3. **BACK PORCH** – The normal detection mode. Reference phase samples are taken during the Back Porch period where the reference signal is subjected to the least phase distortion.

4. **SYNC TIP** – Reference phase samples are taken during the Sync Tip time. The Sync Tip detector may be used in conjunction with the Back Porch detector to check for effects caused by carrier phase shift of the sync pulse.

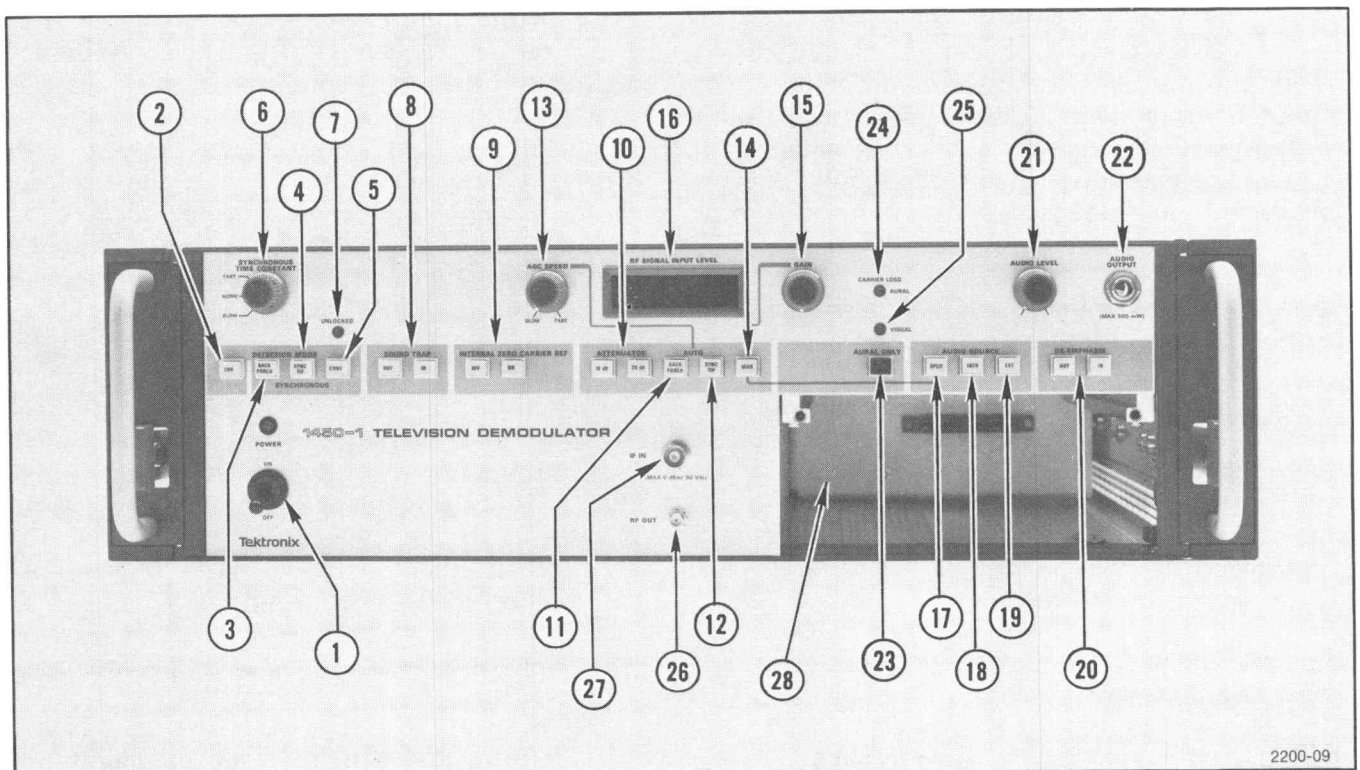


Fig. 2-1. 1450-1 front-panel controls, connectors, and indicators.

5. **CONT** – The phase-lock correction is continuously applied in this mode.

6. **SYNCHRONOUS TIME CONSTANT** – This switch sets the phase-lock loop bandwidth. A slow time constant allows transmitter phase jitter to pass through the demodulator for measurement. A fast time constant will cause the demodulator to track the jitter, eliminating it as a possible source of interference for other measurements.

7. **UNLOCKED light** – A red LED which indicates that phase lock (required for synchronous detection) has not been achieved. The demodulator is automatically switched to the Envelope Detection mode when this light is on.

8. **SOUND TRAP** – Selects the bandwidth of the IF (intermediate frequency) system. With the sound trap **OUT**, the wide band filter is selected. When the sound trap is **IN**, the narrow band filter is selected.

9. **INTERNAL ZERO CARRIER REF** – When the **ON** button is pushed, a Zero Carrier Reference signal is generated and inserted on the signal during a selected line.

10. **ATTENUATOR (10 dB and 20 dB buttons)** – These buttons select the attenuation of the input signal in 10 dB steps. 0 dB is selected with both buttons out, and 30 dB is selected when both buttons are pushed in. The readout still indicates the correct input power with the attenuators in or out.

**AUTO** – Selects either Back Porch or Sync Tip reference Automatic Gain Control (AGC).

11. **BACK PORCH** – Video output is automatic gain controlled (to 1 Vp-p composite video) referenced to the back porch at 0 Volts.

12. **SYNC TIP** – Video output is automatic gain controlled (to 1 Vp-p composite video) referenced to the sync tip at -286 mV.

13. **AGC SPEED** – A potentiometer that determines the speed of the AGC.

**SLOW** – Shows hum and low frequency noise.  
**FAST** – Masks low frequency noise and hum to display a more stable signal.

14. **MAN** – This mode disables the AGC and allows manual control of the output amplitude. It can be used to monitor amplitude shifts on a waveform monitor.

15. **GAIN** – This control is a three-turn potentiometer that controls the gain of the video output signal in the manual mode.

16. **READOUT** – The LED readout is calibrated to indicate the input power level in dBm (0 dBm = 1 mW). When the input power level is out of the AGC range one of the two diodes on the right side of the readout will light. The upper LED indicates that the signal is too high, and the lower LED indicates that the signal is too small. When using the Manual Gain control, the correct output voltage will be obtained and the correct input power indicated when both of the diodes on the right side are out. The readout will also be correct whether the attenuators are in or out.

**AUDIO SOURCE** – These buttons select the type of audio desired.

17. **SPLIT** – Selects Split. Source is the difference between the aural carrier and an oscillator at the visual carrier frequency. This choice is used to accurately measure the aural transmitter.

18. **INTR** – Selects Intercarrier. Source is the difference between the aural carrier and the visual carrier. PM noise on the visual carrier will be added to the audio in this mode. This choice is used to measure the effect of the picture carrier noise on the signal.

**SPLIT and INTR pushed in** – Acts as **EXT**. Selects the signal fed to the rear-panel AURAL INTERCARRIER IN connector as the source.

19. **Q-P** – Selects the Quasi-Parallel signal as the source. This is the buffered 24 MHz signal after balanced side band filtering. This prevents AM phase distortion from occurring.

20. **DE-EMPHASIS** – Selects whether de-emphasis is applied to the audio signal or not.

**IN** – This is the normal setting for monitoring. De-emphasis is applied according to the FCC 75  $\mu$ sec curve.



OUT – Passes the sound signal through a flat amplifier. This is used for checking the aural transmitter.

21. AUDIO LEVEL – Controls the level of the speaker and headphone audio output signals.

22. AUDIO OUTPUT – A phone jack for headphone monitoring and testing using the audio. This output only has monaural capability.

23. AURAL ONLY – When the MAN gain, SPLIT AUDIO SOURCE, and AURAL ONLY buttons are all pushed in, the demodulator will lock to the aural transmitter carrier when no picture carrier is present.

24. AURAL Alarm Light – A red LED, when lit, indicates loss of the aural carrier. In the AGC mode, a loss of the visual carrier will also cause the AURAL alarm to light. In the MANUAL GAIN mode, the AURAL alarm acts independently.

25. VISUAL Alarm Light – A red LED, when lit, indicates loss of the visual carrier. The instrument must be in the AGC mode.

26. RF OUT – A 50 $\Omega$  SMA connector which provides output of the RF signal from the rear-panel RF INPUT through the 0 to 30 dB attenuator. A 50 $\Omega$  SMA-to-SMA cable makes a reliable connection of the signal path from the mainframe to the plug-in.

27. IF IN – A 50 $\Omega$  BNC input. Accepts the specified intermediate frequency (IF) at -64 dBm to -20 dBm from the DOWN CONVERTER or from an external 50 $\Omega$  source (i.e., transmitter IF).

#### NOTE

*An external signal applied directly to the IF IN connector will cause the readout to read 4.7 dBm less than the actual signal level. For example, a -20 dBm signal at the IF Input will cause a readout display of -24.7 dBm.*

28. DOWN CONVERTER Plug-In – Contains the RF front end, tuned to the specified channel frequencies. Converts the RF to the specified IF with the aural IF 4.5 MHz above the visual IF.

## REAR PANEL (See Fig. 2-2)

29. AURAL INTERCARRIER IN – A 50 $\Omega$  BNC input for an external 4.5 MHz FM drive signal.

30. AURAL INTERCARRIER OUT – A 50 $\Omega$  BNC output for an external 4.5 MHz audio subcarrier.

31. DEVIATION OUT – Audio directly out of the discriminator calibrated for 10 mV peak/kHz deviation. A sine wave signal with +25 kHz deviation produces a 0.50 Vp-p output signal.

32. 600 $\Omega$  BALANCED LINE – A 600 $\Omega$  audio output. (XLR-3-14 male connector; mates with Cannon XLR-3-11SC or equivalent.) This output can have either a 150 kHz (stereo) or 25 kHz (monophonic) bandwidth. This is selectable via an internal jumper.

33. 8 $\Omega$  SPEAKER – A two-terminal barrier strip for connection to an 8 $\Omega$  speaker. This output only has monaural capabilities.

34. RF INPUT – A 50 $\Omega$  input BNC connector.

35. REMOTE – A connector which supplies open and closed circuit contacts corresponding to a loss of carrier. These contacts can be used to drive a remote carrier-loss alarm. A remote envelope detection mode switch line is also included.

36. ZERO CARRIER REF DRIVE INPUT – Accepts a positive-going external Zero Carrier Reference pulse (from a TEKTRONIX 1440).

37. QUADRATURE – 75 $\Omega$  output of the quadrature detector. The signal can be used in conjunction with the video output on a high frequency XY monitor or a 1480 Waveform Monitor with an external phase graticule (Tektronix part number 331-0393-12) and a lowpass filter to provide a vector presentation of the RF signal.

38. VIDEO OUTPUT – Two 75 $\Omega$  BNC connectors provide the demodulated video.

39. POWER CONNECTOR / FUSE HOLDER – Contains the power-cord receptacle, the fuse holder, and the line voltage selector. Line voltage selection is done via a plug-in circuit board.

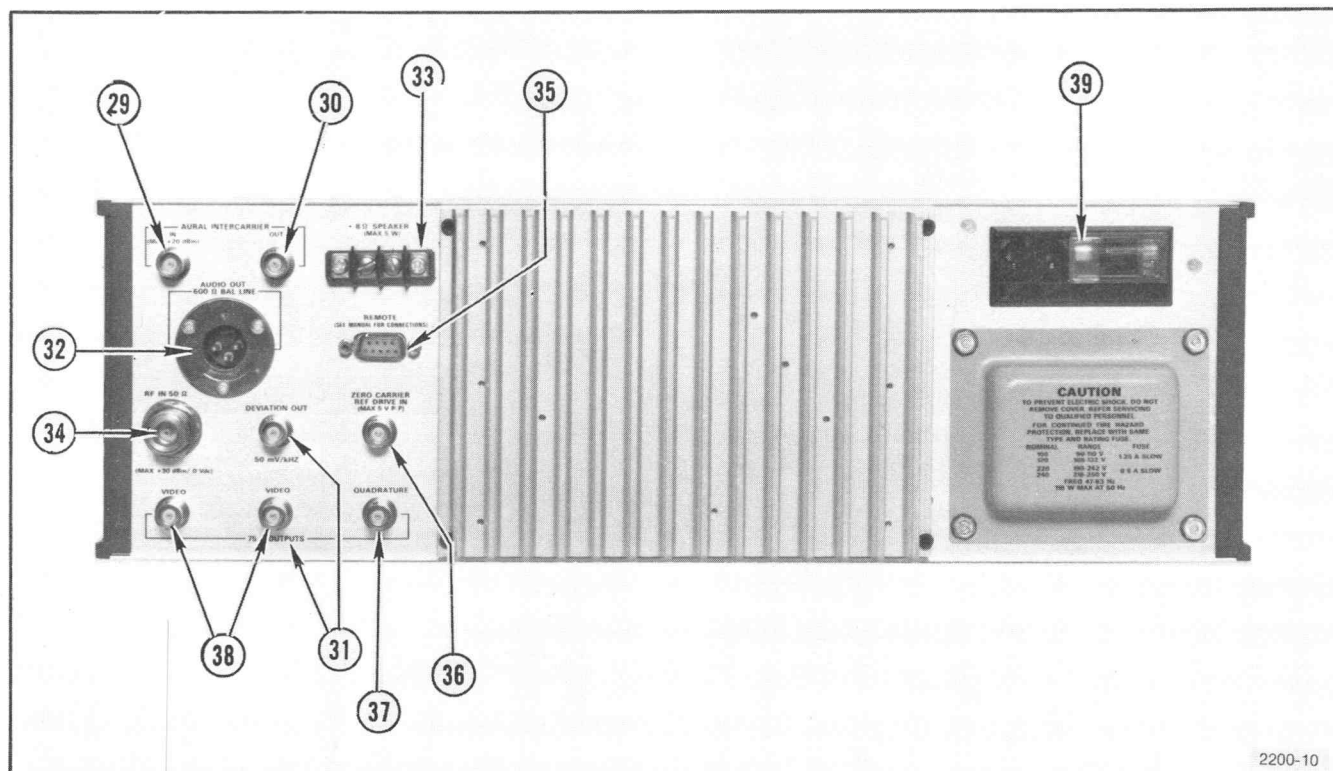


Fig. 2-2. Rear-panel connectors.

## USING THE DEMODULATOR

The 1450-1 Television Demodulator may be used for accurate transmitter measurements, and for monitoring and rebroadcast of broadcast signals.

### Applying a Signal

The RF IN impedance of the 1450-1 is 50Ω. At high frequencies, impedance mismatches between the RF IN and the signal can cause reflections in the transmission line, and degrade the instrument performance. To reduce mismatch, use good quality 50Ω coax cable to connect the signal source to the RF IN, and keep the cable as short as possible to reduce the cable losses.

The 1450-1 can be used with a 75Ω signal source by using a 75Ω-to-50Ω minimum loss pad or matching transformer. If an antenna is used, its bandpass characteristics should be known.

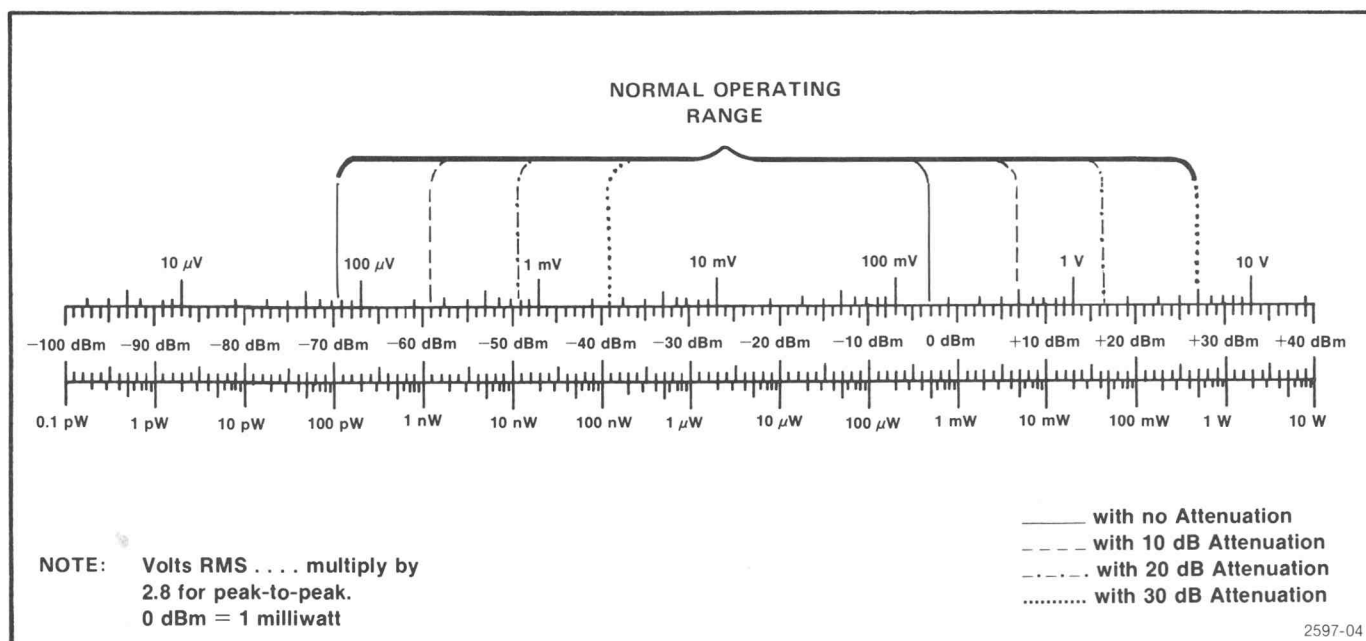
Sensitivity and power levels are often rated in dBm (dB with reference to 1 mW, regardless of impedance). Sensitivity and power levels for 75Ω

systems are usually rated in dBmV (dB with reference to 1 mV across 75Ω). Fig. 2-3 gives a convenient chart for converting volts to dBm to watts. To convert dBm to dBmV, add 48.75 to dBm.

Signals fed to the 1450-1 should be between -69 dBm and -3 dBm. The front-panel 10 dB and 20 dB ATTENUATORS may be switched in to accept signals to +27 dBm. If signals larger than +27 dBm are encountered at the transmitter test points, external pads should be inserted to bring the signal within range.

### Verifying the Demodulator

In the 1450-1, effects of the modulation process are minimized and allowed for in the instrument's specifications. However, to improve the accuracy of some measurements it is useful to know how the demodulator affects a test signal. This information can be included in the evaluation of a demodulated signal to determine more precisely how the circuit under test is performing.

Fig. 2-3. Volts-dBm-Watts Conversion Chart for 50 $\Omega$  impedance.

The demodulator may be verified by feeding a set of test signals through an RF modulator with known characteristics to the demodulator. To determine the demodulator characteristics, combine (normalize) the characteristics of the modulator with the output obtained from the demodulator, and compare the results with the input signal. If the modulator has a negligible effect on the signal, a set of waveform photographs may be taken and used as a record of the demodulator's performance. Fig. 2-4 shows a set of test-signal waveform photographs obtained from a typical 1450-1 driven with a good quality test modulator.

If a modulator is not available, the waveforms in Fig. 2-4 may be used to get an idea of how a 1450-1 is probably affecting the signal.

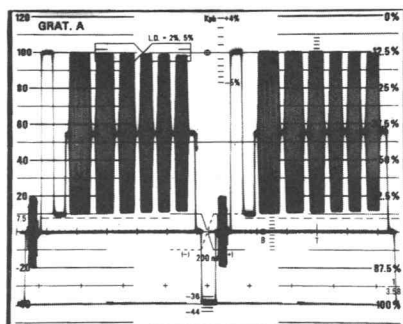
## Monitoring and Rebroadcast

The 1450-1 may be used as an in-service transmitter demodulator to monitor VIT signals, either at the transmitter or at a remote site. It may also be used as a high quality receiver for CATV or to pick up a network feed from another station for rebroadcast.

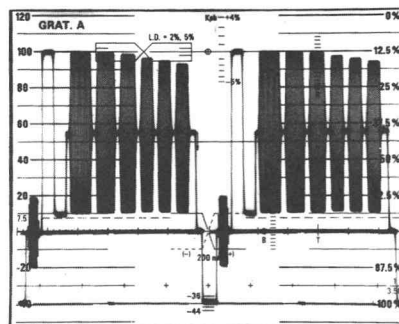
Typical 1450-1 control settings for the monitoring mode are:

DETECTION MODE	SYNCHRONOUS, BACK PORCH
SYNCH TIME CONSTANT	NORM
SOUND TRAP	IN
INT ZERO CARRIER REF	ON
ATTENUATOR	As needed
Gain Control	BACK PORCH AGC
AGC SPEED	FAST for rebroadcast SLOW for monitoring
AURAL ONLY	OUT
AUDIO SOURCE	SPLIT (INTR to check intercarrier buzz)
DE-EMPHASIS	IN

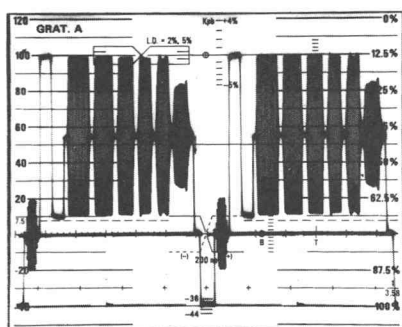
Synchronous detection will give the most accurate results except in the special case where the transmitter has appreciable incidental-carrier phase modulation (ICPM) that cannot be corrected, and has been adjusted using envelope detection. In this case, envelope detection should also be used for monitoring. (ICPM is discussed later in this section.)



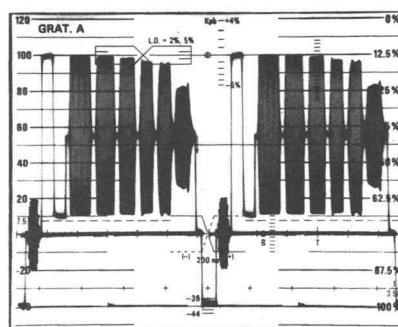
SYNCHRONOUS DETECTION  
SOUND TRAP OUT



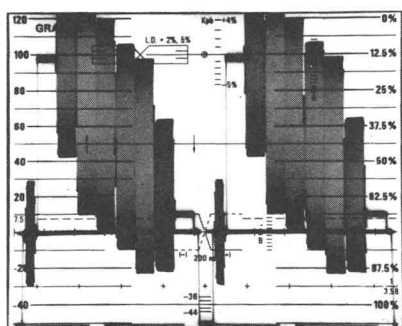
ENVELOPE DETECTION  
SOUND TRAP OUT



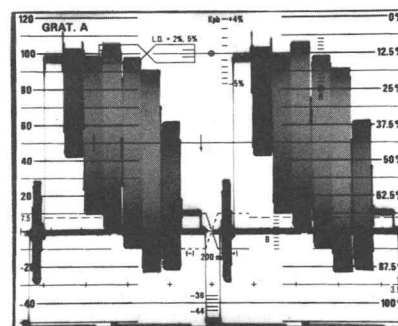
SYNCHRONOUS DETECTION  
SOUND TRAP IN



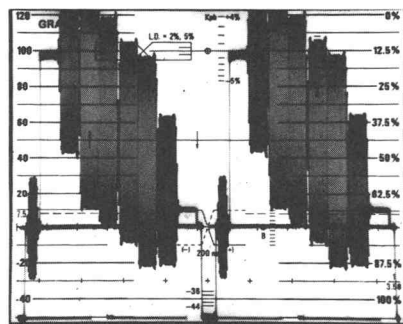
ENVELOPE DETECTION  
SOUND TRAP IN



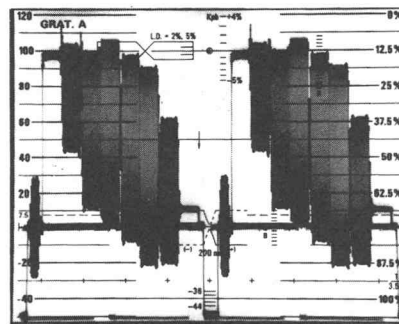
SYNCHRONOUS DETECTION  
SOUND TRAP OUT



ENVELOPE DETECTION  
SOUND TRAP OUT



SYNCHRONOUS DETECTION  
SOUND TRAP IN



ENVELOPE DETECTION  
SOUND TRAP IN

2200-11

Fig. 2-4. 1450-1 response to typical test signals.

## Measuring the Visual Transmitter

Most visual transmitter adjustments and measurements should be made with the demodulator in the synchronous detection mode and the wideband IF filter selected. The visual transmitter envelope delay pre-correction and the aural transmitter should be off. Fig. 2-5 shows some typical transmitter measurement points.

Typical 1450-1 control settings are:

DETECTION MODE	SYNCHRONOUS, BACK PORCH (ENV for phase and delay checks)
SYNCH TIME CONSTANT	NORM
SOUND TRAP	OUT
INT ZERO CARRIER REF	ON
ATTENUATOR	As needed
Gain Control	BACK PORCH AGC
AURAL ONLY	OUT

Differential phase, burst-to-subcarrier phase, and envelope delay should be measured in the envelope detection mode, then verified with synchronous detection. Any differences observed when switching between the envelope and synchronous modes are indications of incidental-carrier phase modulation (ICPM). If the ICPM cannot be corrected, adjust the transmitter using the envelope detector for these measurements. This should result in the best picture on a typical home receiver.

**Incidental-Carrier Phase Modulation.** ICPM is a change in carrier phase with signal level change. This shows up as apparent differences between measurements made in the synchronous and the envelope detection modes. Differential phase, color bar phase errors, low-frequency delay, and other test signal errors are affected. On home receivers, with envelope detectors, the picture will be unaffected if the visual transmitter has been adjusted using envelope detection where there is appreciable ICPM. However, the ICPM can show up in the home receiver's audio as intercarrier buzz.

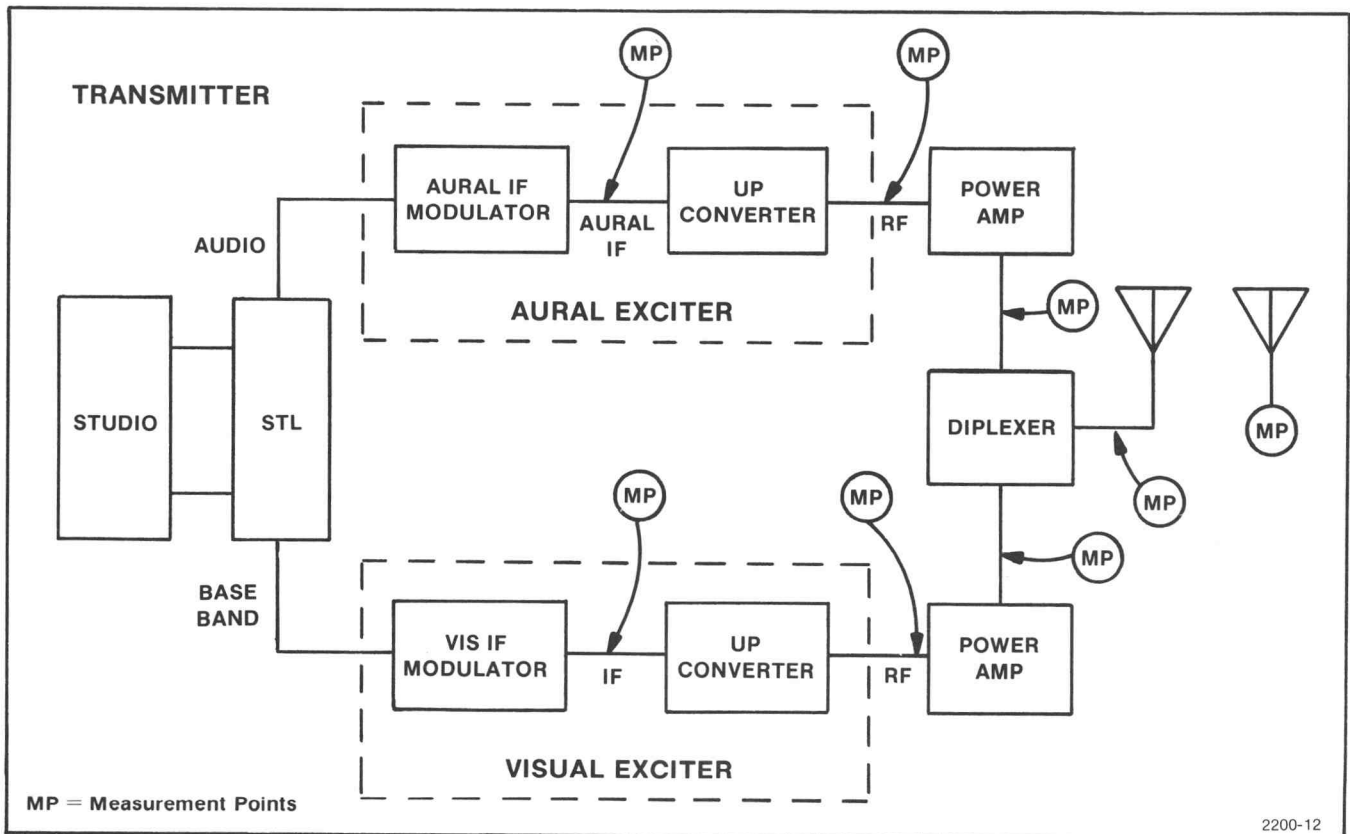


Fig. 2-5. Typical transmitter measurement points.

ICPM can have many sources. The following changes with signal level are some of the sources: input impedance and other changes through linear amplifiers, carrier feed through, and electrical length changes in UHF klystron and traveling-wave tubes.

With the 1450-1 in the SYNCHRONOUS DETECTION MODE, a very useful polar coordinate display can be created to measure ICPM. Using an XY monitor, or an oscilloscope or waveform monitor with an external horizontal input, the in-phase VIDEO OUT signal is applied to the vertical input (as usual), and the QUADRATURE OUT signal is applied to the horizontal input. Fig. 2-6 shows typical ICPM test setups.

Use an unmodulated, 0 to 100 IRE, 10-step staircase or ramp as the test signal. The SYNC TIP DETECTION mode will cause the sync tip to line up with the zero carrier reference pulse at 0°. If no ICPM is present on the carrier, the display between the sync and zero carrier will line up on the vertical axis. If ICPM is present the display will tilt. The amount of ICPM can be found by measuring the angle of the tilt from the vertical axis. Find the point of maximum tilt, and measure the amount of deflection horizontally and vertically from the zero carrier reference pulse. Calculate the amount of ICPM using the formula:

$$\text{ICPM (in degrees)} = \arctan (\text{horizontal deflection} / \text{vertical deflection})$$

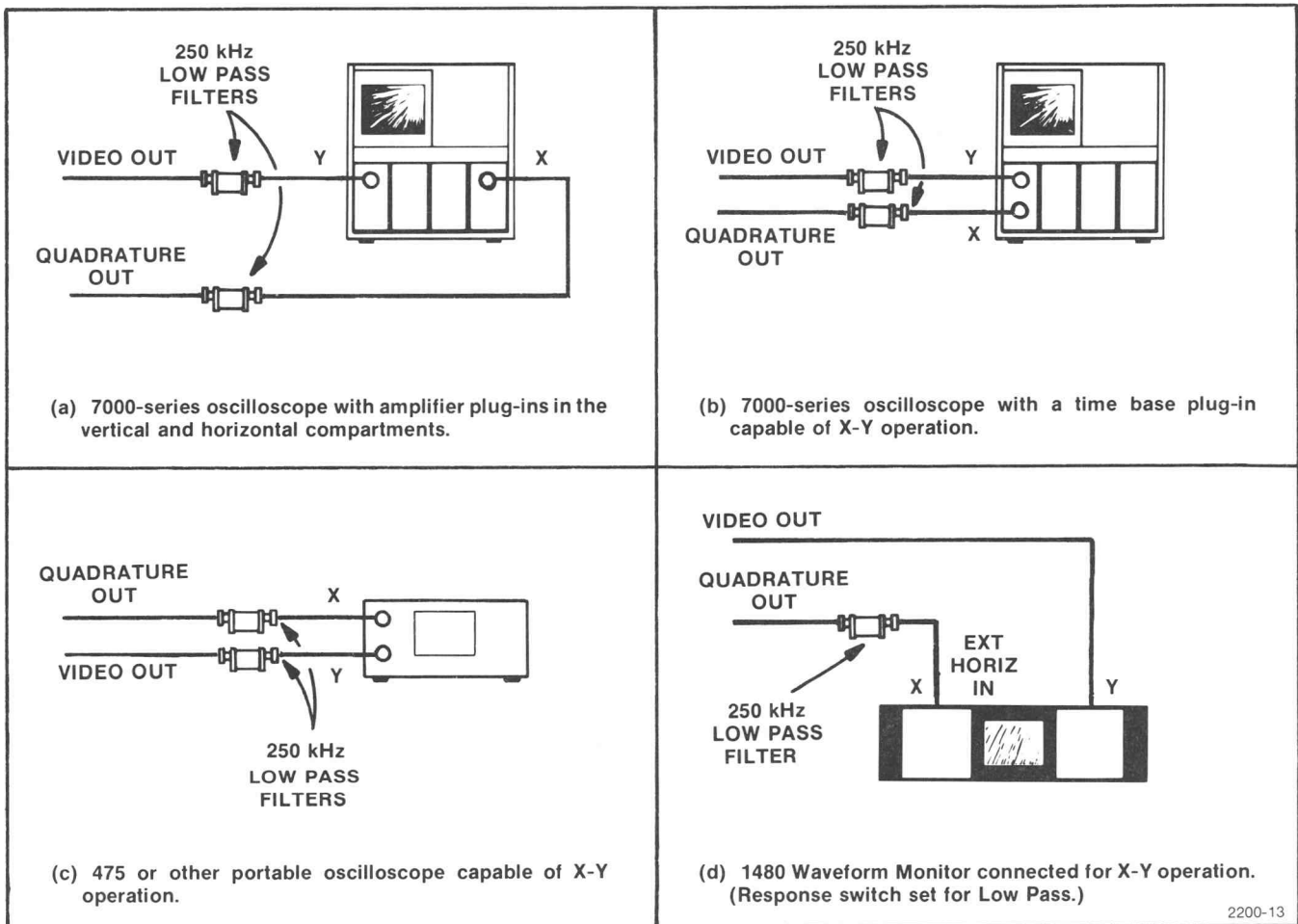


Fig. 2-6. Incidental Carrier Phase Modulation (ICPM) measurement setups.



**EXAMPLE:** An oscilloscope set up for XY operation gives the display shown in Fig. 2-7. The peak white of a 10 step staircase signal is the maximum point of tilt from the center (0° line). The vertical amplifier is set for 0.2V/div, and the horizontal amplifier is set for 20mV/div. The peak white is located 4.5 vertical divisions and 2 horizontal divisions from the zero carrier reference pulse. Find the amount of ICPM.

**SOLUTION :**

$$\begin{aligned}\text{Vertical deflection} &= 0.2\text{V/div} * 4.5 \text{ div} \\ &= 900 \text{ mV} \\ \text{Horizontal deflection} &= 20\text{mV/div} * 2 \text{ div} \\ &= 40 \text{ mV} \\ \text{ICPM} &= \arctan (40 \text{ mV}/900 \text{ mV}) \\ &= \arctan (0.0444) \\ &= 2.5 \text{ degrees}\end{aligned}$$

For all but very clean test signals, a lowpass filter in both the horizontal and vertical channels will be helpful in reducing clutter on the display. A filter designed for this purpose is available from Tektronix (Tektronix Part No. 015-0352- 00). Fig. 2-8 shows the effect of lowpass filtering on a typical test signal.

An external graticule (Tektronix Part No. 331-0393-12) for the TEKTRONIX 1480 Waveform Monitor has been developed to measure ICPM. (See Fig. 2-9.) To use this graticule, connect the QUADRATURE OUT through a 250 kHz lowpass filter to the 1480 External Horizontal input, and the VIDEO OUT directly to the vertical input. Set the 1480 for Lowpass Response, appropriate vertical channel, 1.0 Volts Full Scale, X25 Magnifier, and Ext Horizontal.

**NOTE**

*TEKTRONIX 1480 Waveform Monitors are shipped from the factory with the EXT Horizontal function disabled to prevent accidental CRT burns. Qualified service personnel should consult the 1480 Instruction Manual or contact their local Tektronix Field Office for information on connecting the 1480 for External Horizontal operation.*

Position the zero carrier reference pulse (top of the displayed signal) to the location marked on the graticule. The graticule is calibrated for 2° per radial division when the Magnifier is set for X25, and 1° per division with X50 magnification. Measure any ICPM directly from the graticule.

TEKTRONIX 465/475 portable oscilloscopes and 7000-Series oscilloscopes with appropriate plug-ins make very good XY displays. Lowpass filters should be installed in both the horizontal and vertical inputs of these oscilloscopes. Consult the appropriate instruction manual for information on the XY operation.

## Visual Transmitter Precorrection

A 1450-1 may be used with a TEKTRONIX 1440 Automatic Video Corrector in a loop around the transmitter for automatic transmitter precorrection.

Refer to the 1440 manual for further information about precorrection.

**NOTE**

*The 1450 requires a positive-going external zero carrier reference pulse. The TEKTRONIX 1440 is factory-set with a negative-going pulse. A qualified service technician should refer to the Installation and Programming section of the 1440 manual for information regarding changing the zero carrier reference pulse polarity.*

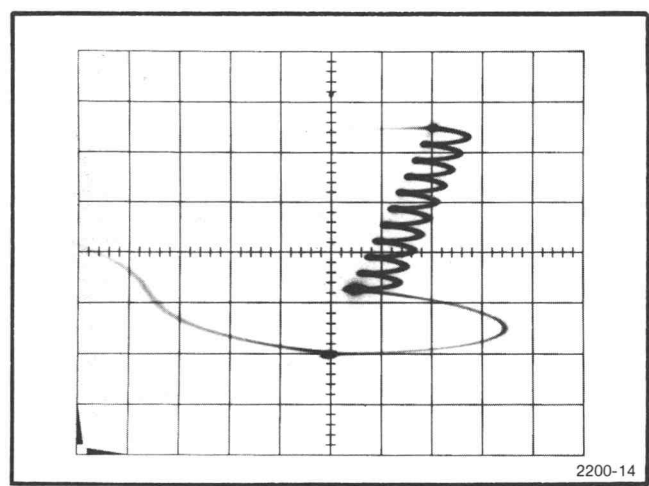


Fig. 2-7. ICPM example.

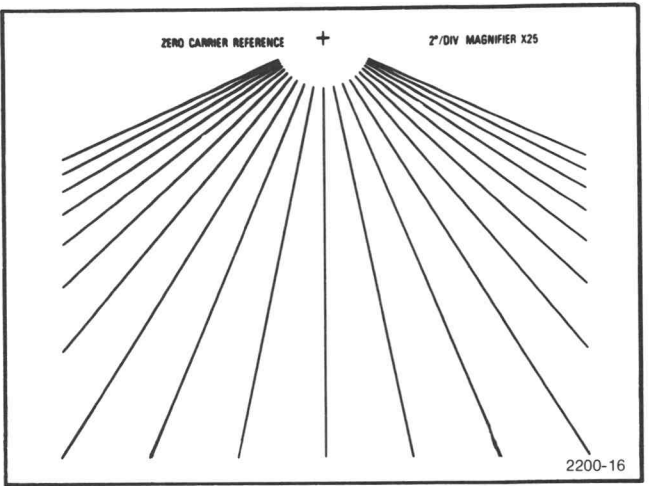


Fig. 2-9. External phase graticule for 1480 Waveform Monitor.

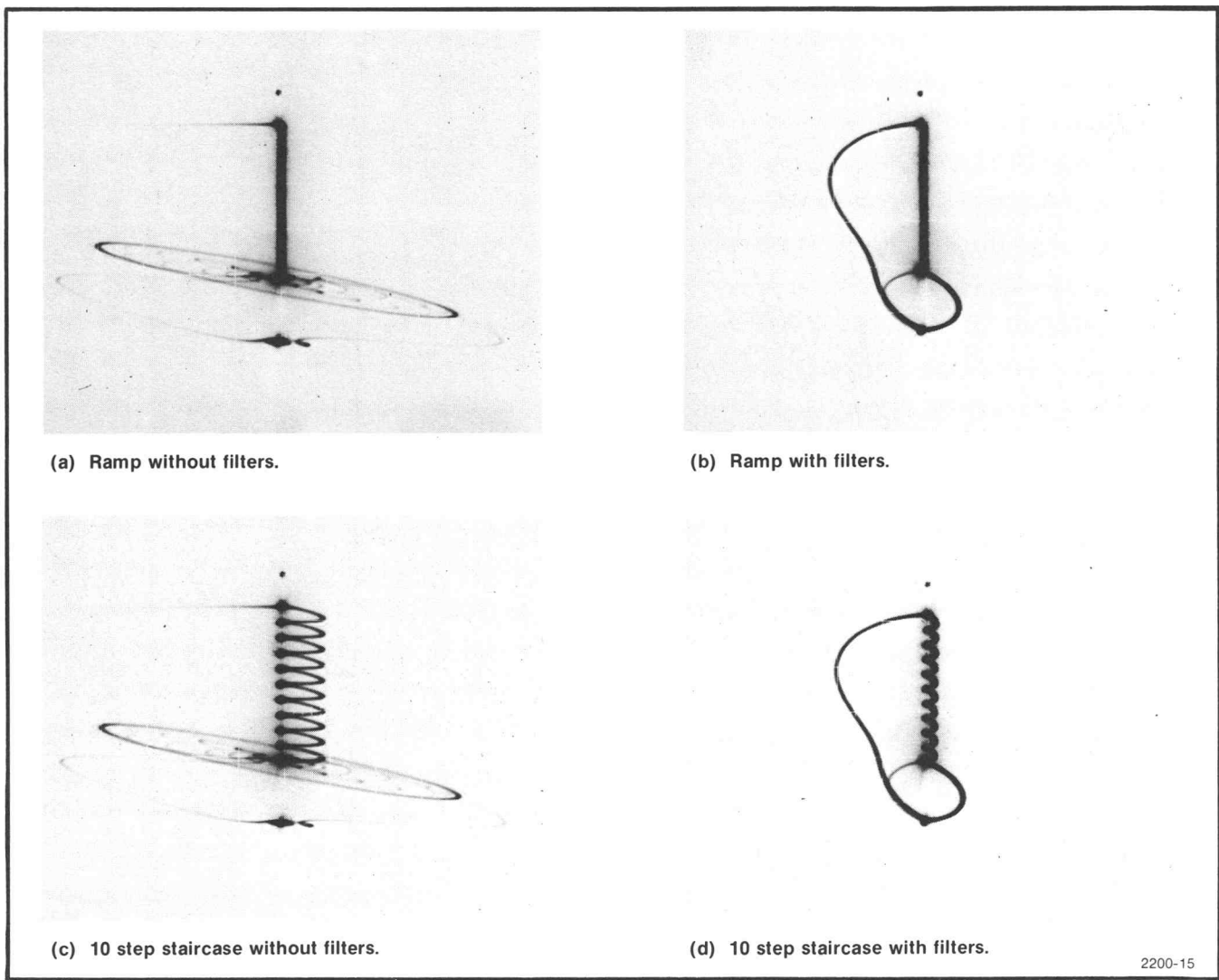


Fig. 2-8. Effect of lowpass filters on ICPM measurement.



## Measuring the Aural Transmitter

The 1450-1 has a high quality audio section. Split, Intercarrier, and Quasi-Parallel sound systems are available. An External AURAL INTERCARRIER IN is also available.

The SPLIT sound mode uses a reference oscillator at the picture carrier frequency to beat with the aural IF producing the 4.5 MHz intercarrier frequency. This results in very clean audio from the demodulator.

The INTR (Intercarrier) AUDIO SOURCE uses the picture carrier, which has been limited, to beat with the aural IF. Any PM or FM in the picture signal will show up in the audio in this mode.

The Q-P (Quasi-Parallel) sound mode uses the 24 MHz signal after it has been buffered, filtered with a symmetrical sideband filter, and limited to beat with the aural IF. The result is an extremely clean signal that has flat phase response for stereo applications.

Out-of-service aural transmitter measurements and adjustments may be performed using the AURAL ONLY mode. This mode locks the 1450-1 to the aural carrier when the visual carrier is off.

Typical 1450-1 control settings for the AURAL ONLY mode are:

ATTENUATOR	as needed
Gain Control	MAN
GAIN	Set for about 0 dBm (0.6Vp-p into 50Ω) signal at AURAL INTERCARRIER OUT
AURAL ONLY	In
AUDIO SOURCE	SPLIT
DE-EMPHASIS	OUT (except when testing Pre-emphasis)
AUDIO LEVEL	As needed

The rear-panel DEVIATION OUTPUT is calibrated to 10 mV/kHz deviation. This signal is useful for checking deviation output on an oscilloscope. Note that the DEVIATION OUTPUT signal with + 25 kHz deviation has a signal amplitude of 0.50 Vp-p.

## Applications of the QUASI-PARALLEL Mode

The Q-P mode will result in a cleaner signal than the Intercarrier mode because the performance is not limited by the Nyquist slope of the SAW filter. As a result, the video to audio crosstalk is minimized. The Q-P mode can also give a cleaner signal than the SPLIT mode in some applications where common mode noise and ICPM is a problem. An example of something that can cause these problems is a cable TV converter. If the input signal has phase noise the Split mode will pass this problem on to the output because it uses a stable local oscillator. While under the same conditions, the Q-P mode will give a cleaner output because it uses an intercarrier signal to track the input. Another application of the Q-P mode is to display what a television receiver using a Quasi-Parallel detection system would be receiving.

## INSTALLATION

### NOTE

*At installation time, save the shipping carton and packing materials for repackaging in case reshipment becomes necessary.*

## ELECTRICAL INSTALLATION

### Down Converter

Slide the down converter into the slot in the 1450-1 mainframe. Be sure that the down converter is firmly seated, then secure it in place with the two thumbscrews.

## Operating Instructions—1450-1

Using the 50  $\Omega$  bnc and SMA cables from the accessories kit, connect the RF and IF signal lines between the mainframe and the down converter. The SMA connectors should be screwed down at least finger tight.

### Power Source

This instrument is intended to operate from a single-phase power source having one of its current-carrying conductors at or near earth ground (the neutral conductor). Only the Line conductor is fused for over-current protection. Systems that have both current-carrying conductors live with respect to ground (such as phase-to-phase on multi-phase systems) are not recommended power sources.

### Mains Frequency and Voltage Ranges

The 1450-1 operates over a frequency range of 48 to 62 Hz, and at nominal mains voltages of 100 Vac, 120 Vac, 220 Vac, or 240 Vac.

A rear-panel voltage selector eases selection of any of these nominal voltages.

### WARNING

*When changing to 220 Vac or 240 Vac operation, use a power cable with appropriate voltage ratings (i.e., Tektronix Part No. 161-0066-01). Product Safety requires this exact power cable be called out.*

### Mains Conversion

Mains voltage selection is accomplished by means of a small circuit board in the power connector-fuse holder assembly on the rear-panel. See Fig. 2-11.

To change mains voltage ranges, remove the power cord, open the cover, and pull the fuse lever down. Insert a pointed tool in the hole at the edge of the voltage-change board and gently pull out of the holder.

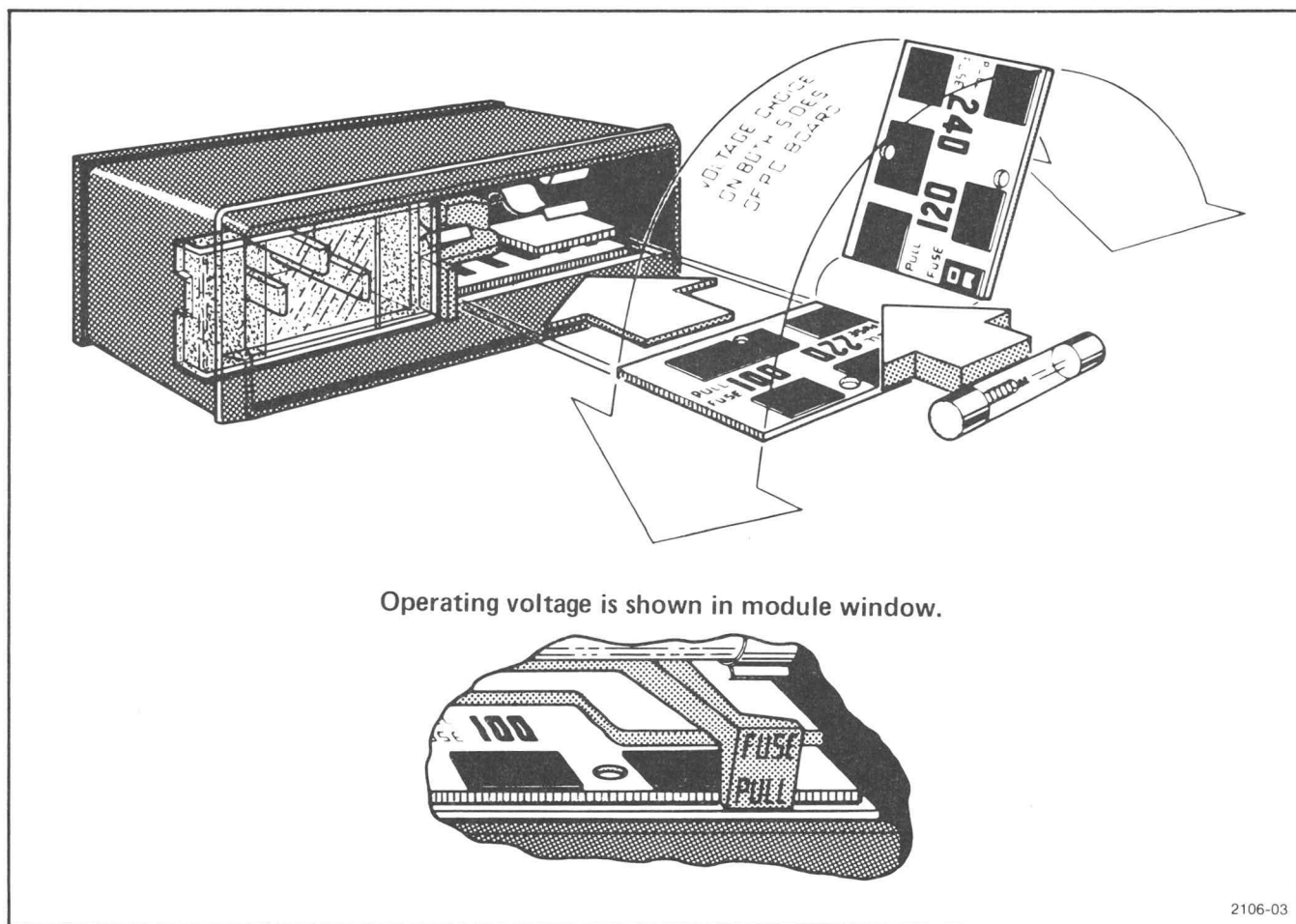


Fig. 2-10. Changing Mains Voltage.

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## Remote Connections

The REMOTE connector on the rear panel may be wired for remote selection of the envelope detection mode, and for an external carrier-loss alarm. See Fig. 2-12 for the pin locations of the REMOTE connector.

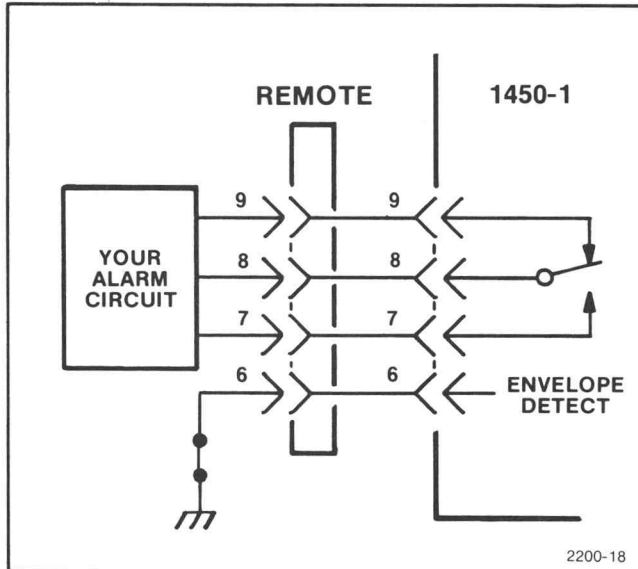


Fig. 2-11. REMOTE Connector Wiring.

**Remote Envelope Switch.** Some measurements require that the demodulator be switched between the envelope and synchronous detection modes. If other measuring equipment is located away from the demodulator, it may be useful to have an external envelope/synchronous switch. This can be accomplished by setting the demodulator for the synchronous mode, and connecting an external switch between pin 6 of the REMOTE connector and ground. Grounding pin 6 will put the 1450-1 in the envelope mode.

**Remote Carrier-Loss Alarm.** The demodulator can be used to activate an alarm circuit that will indicate the loss of a transmitter carrier. A SPDT relay inside the 1450-1 switches when either the visual or aural carrier is missing. The relay contacts are wired to the REMOTE connector, as shown in Fig. 2-12. Pins 8 and 9 close for an alarm, and pins 7 and 8 are open for an alarm. The relay contacts are rated for maximums of 28 volts and 3 amperes.

The relay is energized with normal operation. Therefore, the alarm will also indicate that the instrument power has been shut off inadvertently, or that the mains power has failed (assuming an independent power source for the alarm).

**Wiring the REMOTE Connector.** To wire the external REMOTE connector, the connector must first be disassembled. See Fig. 2-13. Back the hold-down screws into the clamps about three turns (enough to clear the connector body plate). Remove the clamps. Separate the connector body and hood. Feed the wires through the neck of the hood and solder to the appropriate pins on the connector body. Fit the hood over the connector body and replace the clamps. Tighten the neck screws on the hood for a firm fit around the wire cable. Attach the assembled connector to the rear-panel REMOTE connector, and screw in the hold-down screws through the clamps and into the rear-panel standoffs.

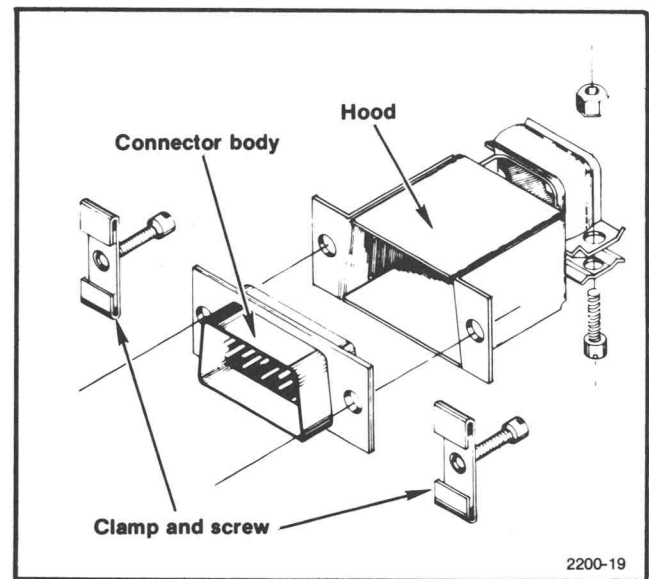


Fig. 2-12. Exploded View of REMOTE Connector.

## MECHANICAL INSTALLATION

### Latching

The 1450-1 incorporates a spring-latch design built into the rack handle. To release, grasp the handles, press the latch knobs toward the center of the instrument, and pull the 1450-1 forward. To re-latch, push the 1450-1 in until the spring-latches catch.

### Thumbscrews

If additional latch strength is needed, the front castings have mounting holes for thumbscrew hold-downs (not supplied with the 1450-1). To gain access to these mounting holes, remove the cover plates under each handle by removing the two screws holding each assembly on. Remove the cover plates and re-install the handles with these same screws. See Fig. 2-14 for mounting hole details.

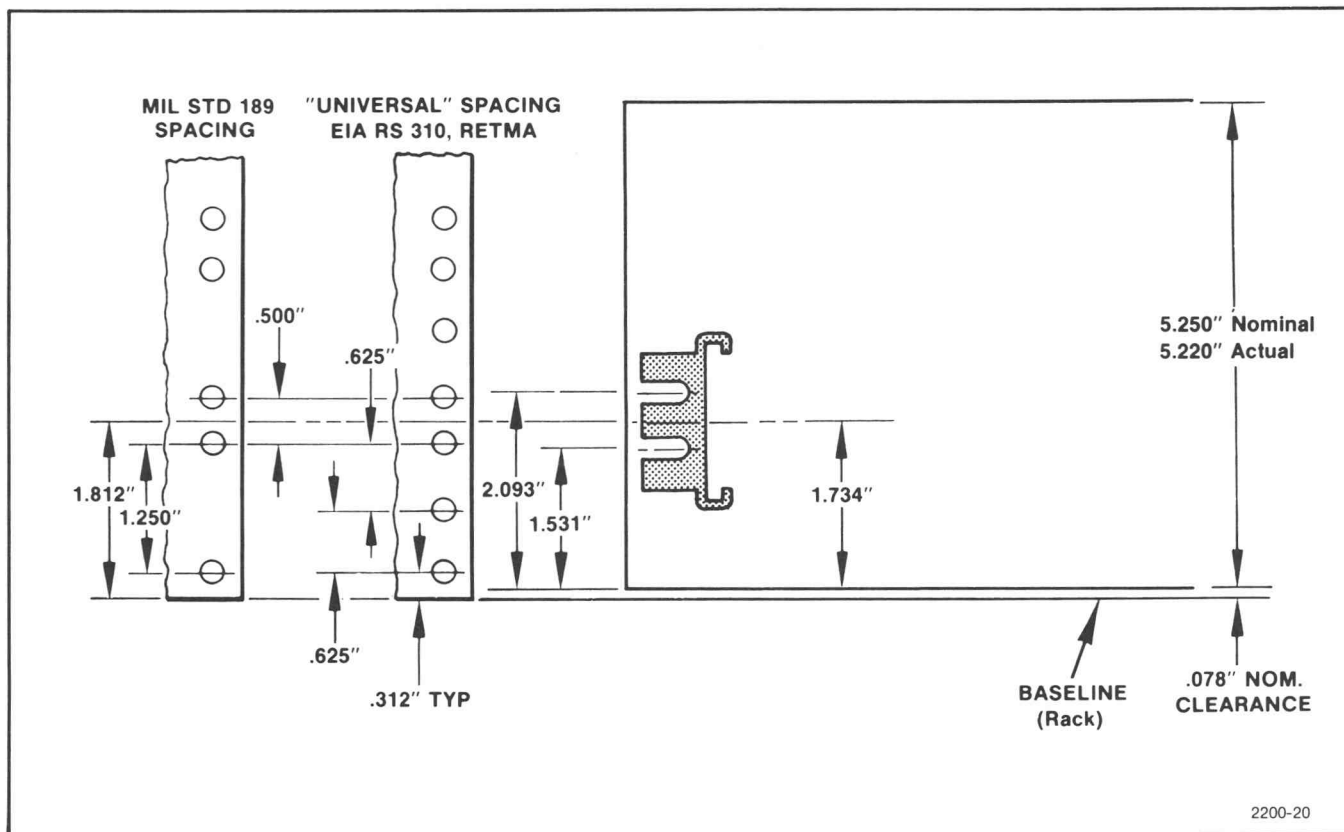


Fig. 2-13. Rackmount Hole Spacing.

#### NOTE

*Because of the spring-latch feature, the 1450-1 cannot be racked in already installed stationary slide sections unless thumbscrew hold-downs are used. The slide tracks supplied with the 1450-1 are required to accommodate the spring latches. The new slides provide a cut-out in the stationary section to catch the shoulder of the spring-latch. See Fig. 2-15.*

#### Rackmounting

The 1450-1 will fit most commercial consoles and 19-inch wide racks whose rail holes conform to universal spacing. See Fig. 2-14 for hole spacing details.

Allow at least two inches of clearance between the 1450-1 rear panel and the rack enclosure to ensure an adequate supply of cooling air.

The slide-out tracks mount easily to the rack front and rear vertical mounting rails if the inside distance between the rails is within 10 1/2 to 24 1/2 inches.

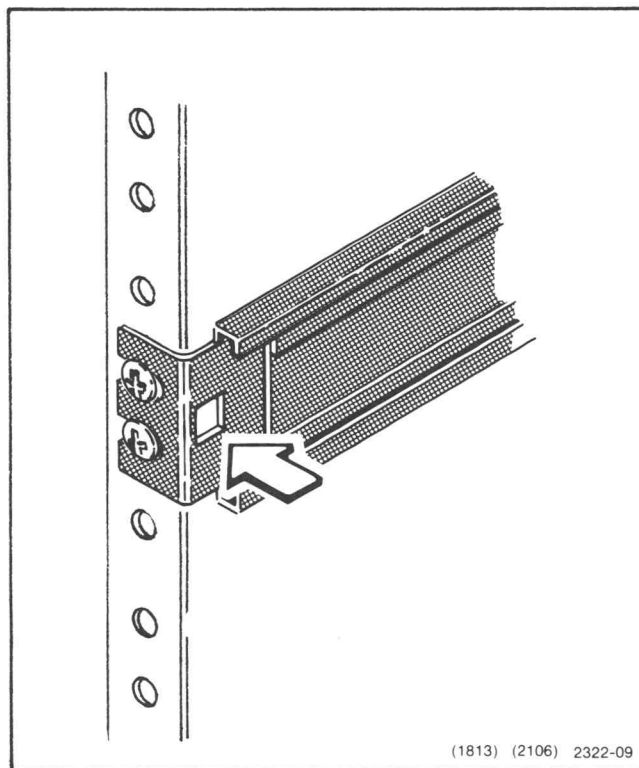


Fig. 2-14. Spring Latch Catch.

If the tracks are going to be installed in a rack whose inside dimension is not within 10 1/2 and 24 1/2 inches, some means of support (for example, extensions to the rear mounting brackets) is needed for the rear ends of the slide-out tracks.

The 1450-1 is 5 1/4 inches high, a multiple of 1.75 inches (the standard rack spacing). As long as the 1450-1 is positioned in the rack some multiple of 1.75 inches from the bottom or top, all the holes should line up and no drilling will be necessary.

The dimension of the opening between front rack rails must be at least 17 5/8 inches in width. The front lip of the stationary-track section mounts in front of the rail. Use bar nuts behind untapped front rails. The front lip of the stationary-track section must mount in front of the front rail to allow the 1450-1 spring-latch to function properly.

The slide-out tracks consist of two assemblies, one for each side of the instrument. Each assembly consists of three sections. See Fig. 2-16. The stationary section of

each track attaches to rack rails as illustrated in Fig. 2-17. The chassis section mounts on the instrument and is installed at the factory. The intermediate section fits between the other two sections, allowing the instrument to be fully extended out of the rack.

The stationary and intermediate sections for both sides are shipped as a matched set and should not be separated. The package includes matched sets for both sides, and mounting hardware. To identify the assemblies, note that the automatic latch and intermediate section stop are located near the top of the matched sets when properly mated to the chassis sections.

To mount the instrument in a rack, select the appropriate holes in the rack rail, using Fig. 2-14 as a guide.

Mount the stationary track sections to the front rack rails with pan head screws (and bar nuts) if the rails are not countersunk. Use flat head screws (and bar nuts) if the rails are countersunk.

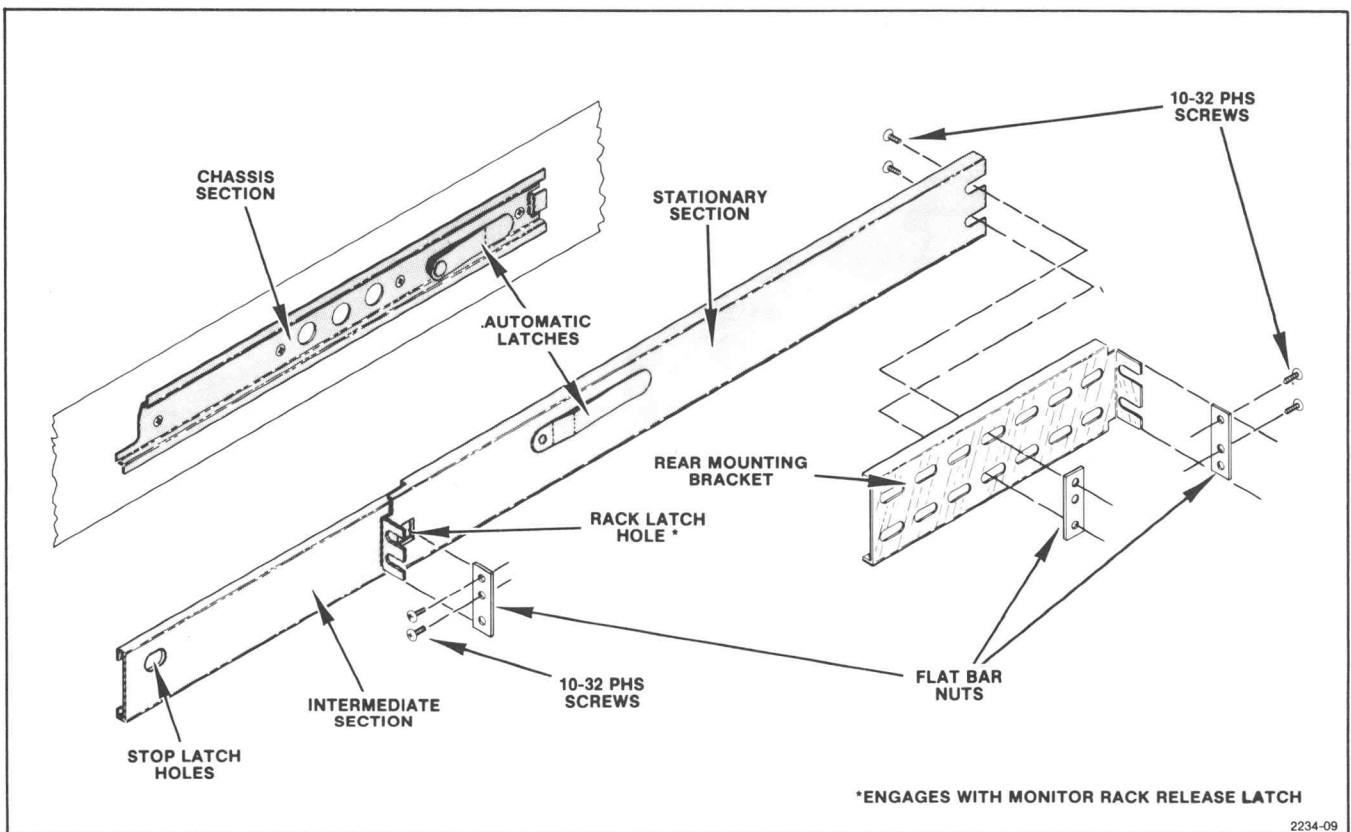


Fig. 2-15. Rackmounting Hardware.

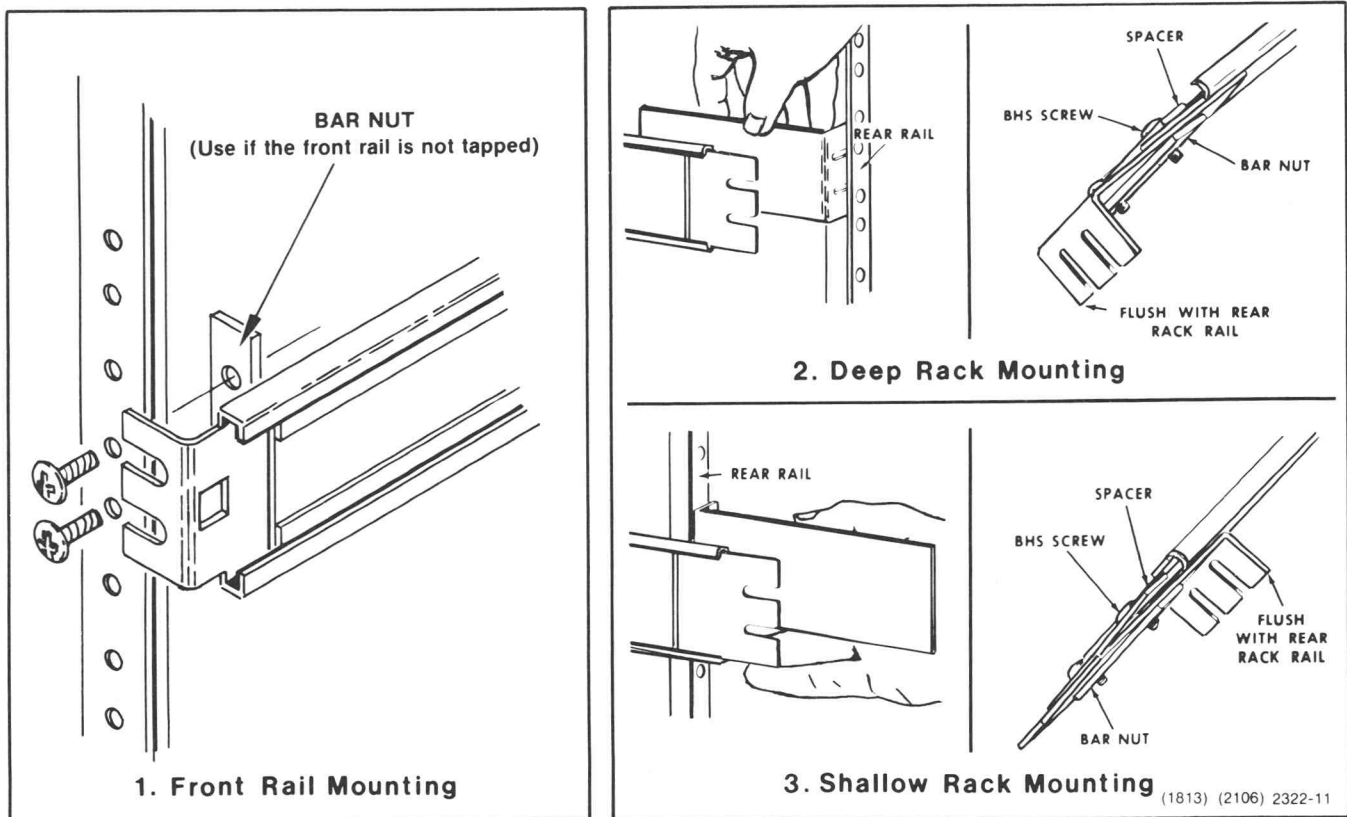


Fig. 2-16. Mounting Stationary Rackmount Sections.

Mount the stationary track sections to the rear rails, using one of the methods in Fig. 2-17. Note that the rear mounting bracket can be installed to fit either a deep or shallow cabinet rack.

After mounting the instrument in the slide-out tracks, adjust for proper width by loosening the front screws and

allowing the slides to seek the proper width. Be sure that the instrument is centered, and re-tighten the screws.

When the instrument is pushed into the rack, an automatic spring-latch engages the back of the front rack rail to hold the instrument in place. To extend the instrument out of the rack, just press in the spring latch on each handle and pull the instrument out.

## **WARNING**

THE FOLLOWING SERVICING INSTRUCTIONS ARE FOR USE BY QUALIFIED PERSONNEL ONLY. TO AVOID PERSONAL INJURY, DO NOT PERFORM ANY SERVICING OTHER THAN THAT CONTAINED IN OPERATING INSTRUCTIONS UNLESS YOU ARE QUALIFIED TO DO SO. REFER TO OPERATORS SAFETY SUMMARY AND SERVICE SAFETY SUMMARY PRIOR TO PERFORMING ANY SERVICE.





# THEORY OF OPERATION

## GENERAL CIRCUIT DESCRIPTION

### Introduction

The 1450-1 is a television demodulator that converts the picture and sound carriers at an intermediate frequency (IF) to baseband video and audio signals. The demodulator is basically a multiple conversion, superheterodyne television receiver. Figure 3-1 shows a simplified block diagram.

A plug-in front end down converter is used to convert the radio frequency (RF) input signal to the first IF stage. Most gain control and amplification occurs in the down converter and first IF stages. The second IF stage provides precise Nyquist-slope filtering, using Surface Acoustic Wave (SAW) devices. This stage also provides the sound IF pick off, and establishes the zero carrier reference level for the picture signal.

The video detector is a product detector that may be used as either an envelope detector or a synchronous detector, depending on the source of the local oscillator (LO) signal driving it. A quadrature video detector provides an output that can be used to make transmitter incidental carrier phase modulation measurements.

The audio section uses a pulse count discriminator to linearly convert the FM sound signal to low distortion audio. Both Intercarrier and Split-sound modes are provided by selection of the local oscillator source to the first audio mixer.

The phase lock section produces a temperature-compensated IF reference frequency, a phase-locked LO source for the IF mixer, and LO sources for the aural mixer and the video detector.

The automatic gain control (AGC) section samples the level of the video output signal, and generates a digital control signal to address read only memories (ROM) that are programmed to operate positive intrinsic negative (PIN) diode attenuators in the down converter and first IF stages. A fine agc is also provided. The digital signal also controls the front-panel LED readout to indicate the input power.

### RF SECTION

RF input signal levels from  $-69$  dBm to  $-3$  dBm can be fed to the input. For stronger signals, an attenuator in the mainframe extends the maximum input range (in 10 dB steps) to  $+27$  dBm. The attenuator is a slab-line, thick-film device which, in addition to attenuation, provides a broadband 50 ohm load for the incoming signal and a 50 ohm source for the filter that follows.

From the input attenuator, the signal goes to a front-panel connector where it is patched to the RF Input of the down converter. The output of the down converter at the IF is similarly patched back to the mainframe front panel.

### IF SECTION

#### First IF

The intermediate frequency of the down converter and mainframe may be 37.0 MHz (Option 1), 38.9 MHz (Option 2), or (most commonly) 45.75 MHz (Option 3). These frequencies correspond to the most popular IF frequencies for transmitters, and allow the 1450-1 to be used for testing the IF output of IF modulated transmitters.

The signal at the first IF stage goes through four amplifier stages, two gain control attenuators, and two bandpass filters. The amplifiers are operated at constant gain, while the signal level is varied by PIN-diode attenuators, controlled by the gain control section. The bandpass filters help reject unwanted signals while providing flat frequency response across the first IF passband.

#### 24 MHz IF

The IF signal is converted to about 24 MHz. The IF converter mixer is a conventional ring diode mixer, with care taken to minimize feedthrough. Typically, the unwanted feedthrough is 60 dB down from the desired output signal.

The 24 MHz signal is filtered to remove extraneous mixer output signals. It then goes to the SAW filter preamplifier, and to a pick off amplifier to provide the Aural IF signal.

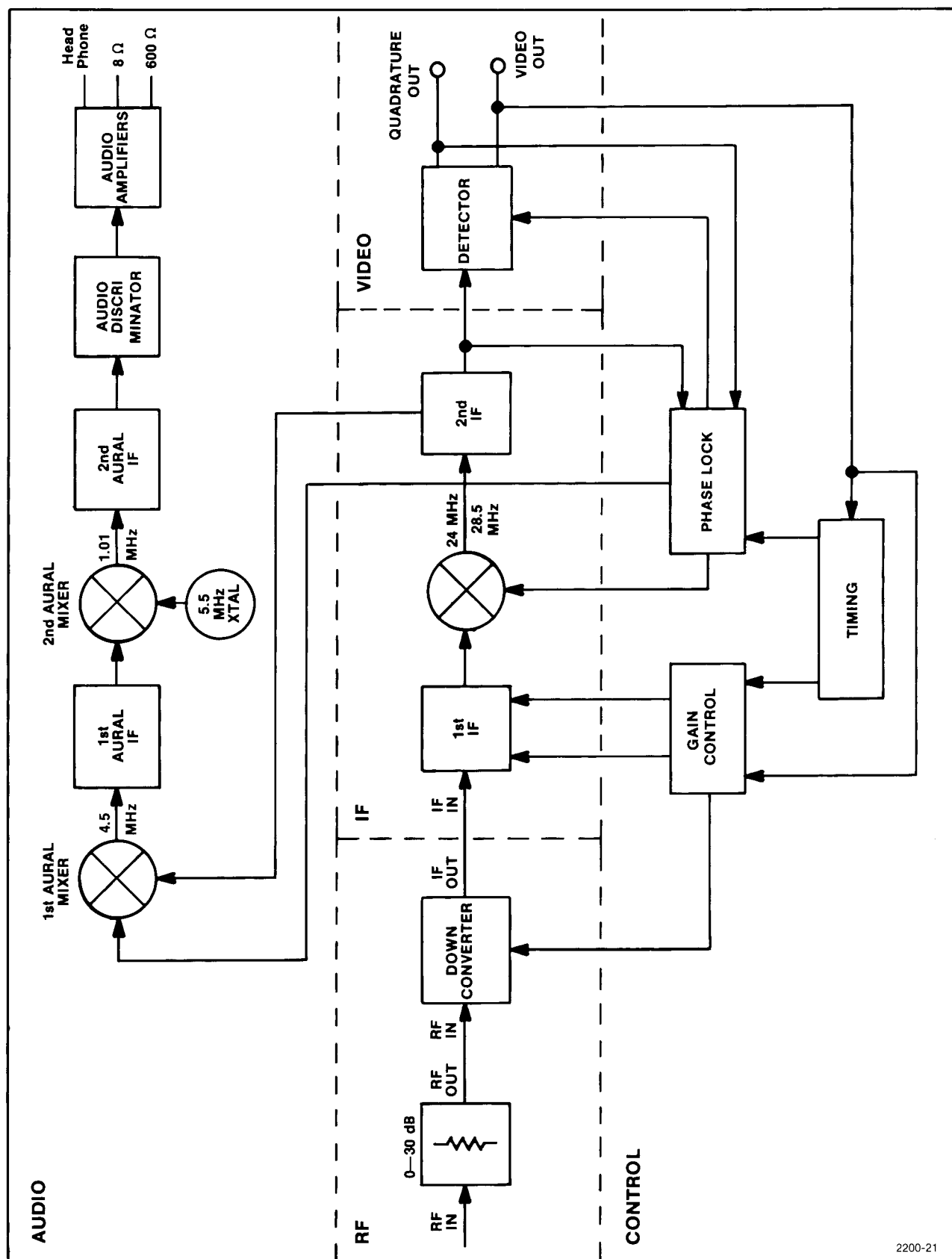


Fig. 3-1. 1450-1 Simplified Block Diagram.

### SAW Filter

The 1450-1 uses SAW filters to obtain the precise Nyquist slope characteristics. Two SAW filters are used in the IF chain. A wideband unit is used for making out-of-service measurements with only the transmitter visual carrier on. A narrow band unit (which attenuates the aural carrier by greater than 55 dB) is used for making in-service measurements with the aural carrier also on.

SAW filters offer several advantages over discrete component designs. The desired bandpass characteristics are more easily achieved. The conventional all-pass sections required to correct the group envelope delay problems of an LC filter are not required, since the SAW filter design allows independent control of amplitude and phase characteristics. The filter requires much less space. There are no calibration adjustments. The filter characteristics do not change with mechanical or thermal shock.

While relative response characteristics of SAW filters remain constant with changes in temperature, the absolute frequency does not. A SAW filter is also difficult to drive. It requires low driving and load impedances ( $\approx 10$  ohms) and has an insertion loss of about 30 dB. This insertion loss, and the fact that the ultimate out-of-band rejection desired is greater than 60 dB, means that at least 90 dB of isolation between input and output is required to achieve the desired performance.

The temperature induced change in operating point is compensated for by placing a temperature sensor near the filter to generate a correcting signal that shifts the 24-MHz intermediate frequency to track the filter. Extensive shielding at the input and output of the filter eliminates the undesired coupling. The 30 dB insertion loss requires the SAW filter preamplifier to be extremely linear to drive the SAW filter with a high level, intermodulation-free signal; and the post amplifier must have relatively low noise to prevent degrading the signal-to-noise ratio.

### Zero Carrier Switch

The zero carrier reference level is established by opening the 24 MHz IF signal path with a diode switch during the zero carrier pulse time. This reduces the carrier by at least 50 dB, allowing a very accurate zero carrier reference.

### The Synchronous Detector

The synchronous detector consists of two product detectors: one supplying the video output, the other the quadrature output. The IF signal to the video detector passes through a delay line of approximately 10 ns, which corresponds to 90 degrees of the 24 MHz IF. The IF signal

to the quadrature detector, on the other hand, passes through a bandpass filter which has an equal 10 ns of delay at 24 MHz, but introduces no phase shift to the IF carrier. Thus, two broadband signals in time coherence but with phase quadrature are produced for detection by the product detectors.

The detector-amplifier combinations have a stringent stability requirement because the quadrature output is the control signal for the phase lock. Any errors in that signal, such as those caused by thermal drift, will cause the phase coherence between the IF signal and the reference LO to be in error. Since accurate phase measurements must be made and good transient response maintained, the phase error cannot be allowed to exceed 1 degree. This means the quiescent output of the quadrature detector-amplifier combination must not change by more than  $\pm 10$  mV over the operating temperature range. This kind of performance is typically achieved only with chopper stabilization techniques.

In the 1450-1, the required stability is achieved with innovative circuit design. An integrated circuit doubly-balanced mixer is used as a current mode switching detector. The bias current of the IC is set up to change with temperature to maintain constant transconductance. The transconductance is stabilized if the dynamic emitter-resistances are held constant, which is done by allowing the emitter current to cancel out the effects of temperature.

The output amplifier that follows the detector is a feedback amplifier that terminates the low-pass filter, and drives the source terminated video and quadrature outputs.

Further, to insure that the potential stability is actually achieved, the instrument is subjected to temperature cycling in the calibration process, during which a single compensating resistor is selected and installed.

The same detector-amplifier circuitry used in the quadrature channel is also used in the video channel. As noted earlier, the video output signal is sampled and used as the control signal for the agc system. Any errors in its output will affect the video output amplitude stability of the instrument.

### Envelope Detection

Envelope detection is accomplished by using the limiter signal as the LO for the video product detector. An advantage of this technique is to provide good linearity to low levels and thus permits accurate measurement of transmitter modulation depth.

## AUDIO SYSTEM

The audio section has a wide bandwidth, a high signal-to-noise ratio, and low distortion. This allows the broadcaster to make critical measurements of the aural transmitter.

The 28.5 MHz aural IF carrier is converted to 4.5 MHz using either the 24 MHz phase lock reference oscillator (Split mode), the SAW filtered video signal (Inter-carrier mode), or the output of the symmetric sideband filter (Quasi-Parallel) as the first local oscillator. The 4.5 MHz signal is amplified and filtered, then converted to 1 MHz using a 5.5 MHz crystal oscillator for the second local oscillator. A limiter removes any amplitude variation, and the 1 MHz signal is then demodulated, using a pulse count discriminator.

The pulse count discriminator is operated at 1 MHz to increase the available output signal, thereby improving the signal-to-noise ratio over the same circuit operating at 4.5 MHz. The discriminator puts out pulses of constant amplitude and duration, whose repetition rate varies with the modulation frequency. The discriminator is an FM detector that exhibits high linearity and is the main factor in achieving the low maximum harmonic distortion specification.

Multiple audio outputs are provided, including 600 $\Omega$  balanced line, 8 $\Omega$  speaker, and front-panel headphone jack. Other outputs include an aural alarm to indicate loss of the aural carrier, a calibrated deviation output, and a 4.5 MHz aural inter-carrier output.

## GAIN CONTROL SECTION

The IF circuitry must handle a wide range of input signal levels (−20 dBm to −64 dBm) and yet maintain a constant bandpass. This is accomplished by operating the amplifiers at a constant gain and providing gain control with variable attenuation between stages. PIN diode attenuators similar to that used in the down converter are located ahead of the second and third IF amplifiers, and provide up to 43.7 dB of gain control range. (The attenuator in the down converter adds another 21.7 dB of attenuation, and the fine gain control fills in between steps with 0.7 dB, for a total agc range of 66 dB.)

The 1450-1 provides a calibrated digital readout of the input power level with an accuracy of  $\pm 1$  dB and a resolution of  $\pm 0.1$  dB. Accordingly, the currents in the attenuator diodes must be set precisely, and differences in

diode characteristics must be compensated for. Adjustments are accomplished through digital control of the diode currents. During the calibration process, each attenuator is characterized and the respective values are digitized and burned into Programmable Read Only

Memories (PROMs). The PROMs then control digital to analog converters (DAC) that generate the required diode currents.

Selection of agc, and selection of the agc reference-level (back porch or sync tip) are accomplished by means of front panel controls. For agc, the video output level is sampled at the selected time and applied to a tracking analog-to-digital converter (ADC). The output of the ADC drives a decoder, which in turn sequentially controls the PIN diode attenuators via PROMs and the DAC. The attenuators are controlled sequentially in order to optimize the system signal-to-noise ratio at any particular setting. Fine agc is applied to the IF Post Amplifier to fill in the 0.7 dB steps of the PIN diode attenuators.

The speed of the agc loop can also be set by a front panel control to allow the operator to either observe (SLOW mode), or eliminate (FAST mode), variations in input signal levels, such as hum modulation or airplane flutter.

The agc circuitry also supplies control signals to actuate alarms in case of loss of the visual or aural carrier.

## TIMING SECTION

This section supplies timing pulses corresponding to the back porch and sync tip times for use in the agc and phase lock sampling circuits. Zero carrier timing pulses are also generated by this section.

## PHASE LOCK SECTION

This section provides a phase locked LO source for the IF mixer, and LO sources for the aural mixer and video detector.

The reference LO, through calibration and temperature compensation, is kept at exactly the frequency that the incoming IF signal must be converted to pass through the SAW filter properly. The limiter output, because it is the same frequency as the converted IF signal, is then compared to the reference LO by the converter phase lock circuitry. Any frequency difference between the two signals is representative of the frequency shift that must be obtained from the converter LO to bring the converted IF signal "on frequency".

## Converter and Reference Local Oscillators

The voltage-controlled oscillators (VCO) for the converter LO and the reference LO meet two conflicting requirements: low phase noise generation and a wide

frequency range capability. Phase noise must be low because any phase variations in these oscillators are added directly to the overall detected signals. This could obscure the phase measurements that the 1450-1 can provide. Wide pull in range is needed to accommodate the  $\pm 100$  kHz variation in the incoming IF, and also to thermally track the SAW filter.

The converter LO and the reference LO are of similar design. Both are composite oscillators, combining the low phase noise of a crystal controlled oscillator with the wide frequency range of an LC oscillator.

In both cases, the VCO output is compared to that of a crystal oscillator, and the resulting difference is converted to a linearly proportional signal by a pulse count discriminator. This signal is compared to the input control signal and the resulting difference is used to control the VCO. Thus, the VCO frequency is linearly proportional to the control signal, and most VCO noise is adjusted out.

The frequency lock circuitry of the reference VCO also accepts a correction signal from a temperature sensor to allow for temperature tracking of the SAW filter characteristics.

### Limiter

This stage picks off the IF signal and amplifies it through limiting amplifiers to remove any amplitude variations. The limiter output serves as the LO source for the video detector in the envelope detection mode, and for the first aural mixer in the Intercarrier sound detection mode.

The limiter has some stringent requirements. It must accommodate a wide range of signal levels (up to 40 dB with modulation), yet introduce less than one degree of phase shift, at about 24 MHz.

Four differential amplifier stages provide a total gain of 60 dB. Adjustable current sources for the amplifiers provide a delay versus amplitude adjustment mechanism for the limiter.

### Phase Shifter

The frequency lock system does not have the capability of responding to fast phase disturbances in the incoming RF signal. The reference LO converter LO phase lock must

work through the SAW filter, which has about 7 microseconds of delay. This limits the rate at which corrections can be applied to that loop.

This difficulty is overcome by providing a method of shifting the phase of the reference LO before it is used to synchronously detect the visual IF signal. Absence of delay or storage elements in this control loop allow the phase to be changed as rapidly as desired.

The response time of the reference LO phase control loop is made selectable so that phase errors in the incoming signal can be displayed and measured (SLOW mode) or tracked out and either eliminated or reduced (FAST mode).

The correction signal for the phase shifter is derived by sampling the output of the quadrature detector during some "resting time", such as back porch or sync tip (front panel selectable). Since the output of the quadrature detector should be zero at those times, it can be used as the control signal for the phase shifter. (A continuous mode of correction is also available by front panel selection, if desired.) The control loop will adjust the phase of the reference LO to make the output voltage of the quadrature detector zero at the selected time.

The correction voltage from the quadrature output is shaped by diode matrices into sine and cosine functions and applied to two mixers, driven 90 degrees apart by the 24-MHz reference oscillator. The outputs of the two mixers are combined to give a constant amplitude sine wave whose phase can be shifted linearly with voltage. The bandwidth of this system is such that corrections can be made at a television line rate, which is actually a limit imposed by the sampling of the reference time (sync tip or back porch).

## MECHANICAL DESIGN

Small circuit boards housed in extruded aluminum compartments comprise the major circuitry. The compartments provide essential shielding between the many oscillators and the sensitive circuitry. Individual covers for the compartments give maximum isolation. Interconnection between circuit boards is accomplished with interface boards and a few rigid coaxial lines. Easy access to components is provided by use of a circuit board extender.

## DETAILED CIRCUIT DESCRIPTION

### Introduction

Use the following discussion along with the schematic diagrams to understand the operation of the 1450-1 Demodulator.

### IF INPUT



#### IF Filter Amplifier Board (A20)

This board provides rejection of unwanted signals, and about 21 dB of power gain for the IF input signal from the down converter or other intermediate frequency (IF) source. The circuits on this board include an input amplifier, a bandpass filter, and an output amplifier. The amplifiers provide good source and load terminations, as well as amplification.

The signal from the IF INPUT connector drives the board at pin 2. For instruments B010120 and up, high frequency mixer products from the down converter are terminated by R28B through C28B (these components are located on the back of the circuit board). The IF signal drives one winding of T18, which is part of a feedback circuit around Q16. Transistor Q16 operates at a low noise, ground base, high linearity amplifier. The input impedance of Q16 is determined by R07, which is factory selected to provide 50 ohms at the IF INPUT connector. The resistance of R07, reflected through T18, determines the input impedance. The output from Q16 drives the emitter of Q04. Voltage gain is provided by grounded-base stages Q16 and Q04 due to the higher collector load impedance versus input impedance. A voltage gain of about 1.6 is provided from the input of L26 to the junction of T18 and R07, and about 1.6 from this point to the junction of L02 and C20. Thermistor RT12 provides gain compensation with temperature. Parasitic oscillations are prevented by LR13. Input impedance to the bandpass filter is approximately 50 ohms, determined by R02, R03, and RT12 reflected through T11, a nine to one impedance transformer.

The IF bandpass filter is essentially flat over the intermediate frequency range. Also included is a trap for the upper alternate (second adjacent) channel video radio frequency carrier. This carrier is located at the low end of the IF passband due to frequency inversion in the down converter. During calibration, capacitors are connected across the inductors via the terminals shown. These capacitors form resonant circuits, allowing the inductors to be adjusted to the correct values.

The output load impedance for the filter is determined by the 1.5 dB, 50 ohm pad consisting of R66, R71, R72, R73 and the input impedance of Q72. Transistors Q72 and Q85 are identical in operation with Q16 and Q04.

Emitter follower Q47 supplies +3 Vdc to the bases of the four amplifier transistors.

Signals feed from the output of Q85 and T89 at 50 ohms impedance through a 50 ohm coaxial cable to the input of the first IF attenuator.

#### IF Attenuator-Amplifier Board (A21)

This board takes the signal from the IF Filter Amp board (A20) and feeds it through a variable positive-intrinsic-negative PIN diode attenuator for up to 21.7 dB of gain control, and then through an amplifier with a constant gain of about 22 dB.

This attenuator is configured as a bridged T network, with CR86 as the series PIN diode attenuator and CR96 and CR98 as the shunt diode elements. See Fig. 3-2. To decrease the IF signal attenuation, the series current through CR86 increases, and the shunt current through CR96 and CR98 decreases. This action reduces the series resistance of CR86, and increases the resistance of CR96 and CR98.

The overall effect increases the signal to the base of Q75, while maintaining a constant 50 ohm impedance at the attenuator input. For increased attenuation, more signal current shunts to ground and less is passed through the series elements. Inductors L75, L76, and L98 supply control current while preventing the signal current from passing to ground.

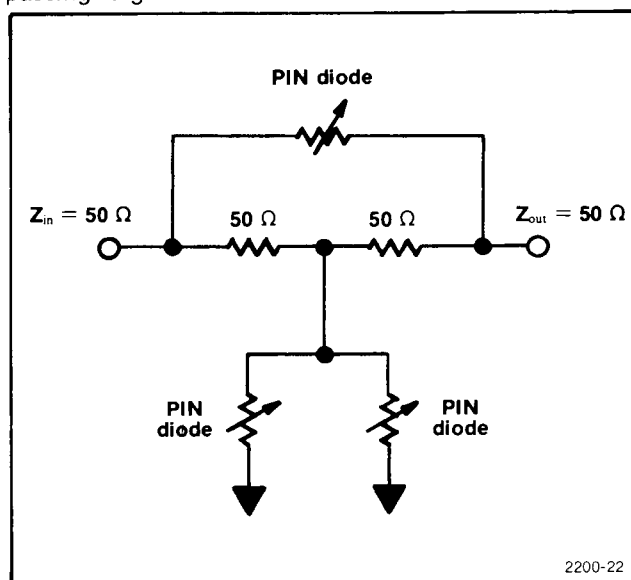


Fig. 3-2. Equivalent Circuit of Bridged Tee PIN Attenuator.

Transistors Q75 and Q62 form an operational amplifier. The input impedance at the base of Q75 is a virtual ground. Ac feedback takes place from the emitter of Q62 to the base of Q75 through R63 and C67. Potentiometer R62 sets the gain of the amplifier, while R46 sets the dc bias for optimum linearity. The voltage gain to the emitter of Q75 is determined by the ratio R63/R84. The voltage across R63, R65, R62, and R54 determines the emitter current for Q62. This current develops a voltage across the collector load (R61) for Q62. The voltage gain to this point is about 22.

The signal output is taken from the collector of Q62 through E42, a ferrite bead parasitic suppressor. Transistors Q42 and Q31 provide current gain for the IF signal, and lower the output impedance to a few ohms. The output passes to the next attenuator and amplifier through R27 and C37.

The output impedance is set at 50 ohms by R27. The overall stage gain is about 22 dB.

For instruments below serial number B010214, overdrive circuitry is included on this board (for later instruments this function is located on the AGC Logic board, A60). Under overdrive conditions, this circuitry provides a positive control signal to the agc circuit to counteract the effect of an overloaded stage between this stage and the video output. Potentiometer R01 is adjusted to forward-bias Q05. This turns Q07 on, which causes a low-level signal, near ground, at the collector of Q07. Should the composite IF signal exceed the predetermined level, CR14 conducts, turning Q05 off. Transistor Q07 is also turned off; the collector goes high, increasing attenuation via the agc voltage.

## IF MIXER and AURAL DRIVE



### IF Attenuator-Mixer-Filter Board (A22)

The circuits on this board provide agc attenuation, two stages of amplification, and conversion to the second IF stage. This board has about 11 dB of loss with minimum attenuation, and about 33 dB loss with maximum attenuation.

The signal from the previous IF circuitry is applied through a PIN diode attenuator to the emitter of Q02. This attenuator operates in a similar manner as previously described under IF Attenuator-Amplifier board (A21). Diodes CR08 and CR09 are the shunt elements, and CR17 is the series element.

The amplifier composed of Q02 and Q23 operates in the same manner as the previously described IF amplifiers. The load impedance for Q23 is approximately 450 ohms, with RT22 providing temperature compensation for the stage gain.

The mixer input filter transforms the load impedance of Q23 to 50 ohms, and prevents harmonics generated in the IF amplifier from passing to the mixer thus generating spurious outputs. The filter also provides overall bandpass tilt adjustment for the IF stage.

The filter output goes through a 50 ohm 4 dB attenuator to provide a broadband 50 ohm load for the filter, and a broadband source for the mixer input, while isolating the two stages. Jumper P53 allows the filter output or the mixer input to be accessed for test and calibration purposes.

The local oscillator input at approximately +20 dBm, at a frequency equal to the first IF plus 24 MHz, is converted by T58 from an unbalanced 50 ohm input impedance to a balanced output, and applied to the mixer.

The mixer is a diode ring type using matched Schottky diodes. The high level local oscillator signal from T58 alternately switches alternate pairs of diodes on and off at the local oscillator rate. The first IF signal is fed via T54. The diode ring alternately grounds the secondary leads of T54 through T58 so that the sum and difference of the local oscillator frequency and the first IF are present at the center tap of the secondary of T54. The difference frequency is the 24 MHz second IF. The two input frequencies are reduced by the balanced action of the mixer. Figure 3-3 shows an example of diode ring mixer operation.

Mixer balance is optimized by adjusting R51 and C63. Either R52 or R53 may be selected or removed to help center the range of R51.

The output from the mixer is taken single ended at the wiper arm of R51. Resistor R62 terminates the mixer output and provides a 50 ohm reflected impedance at the mixer input. The signal through the attenuator drives the emitter of Q81. Transistors Q81 and Q84 form an IF amplifier, at 24 MHz, that is similar in operation to the IF amplifiers discussed previously.

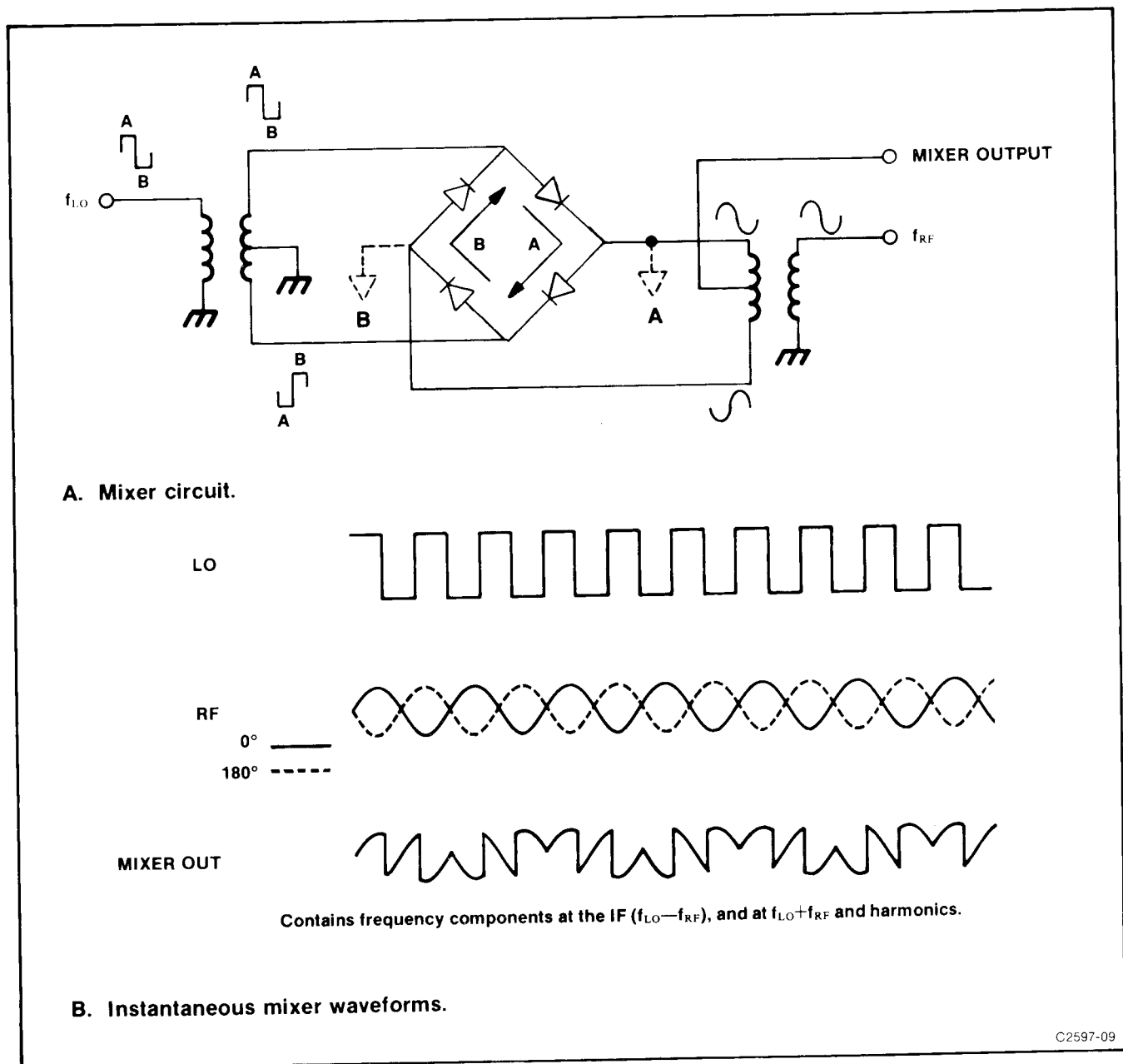


Fig. 3-3. Diode Ring Mixer Operation.

**IF Switch-Aural Drive Board (A23)**

This board adds further selectivity to the IF system. It provides an IF signal to drive the audio circuitry, and a diode-switch circuit to switch the IF signal to either the wide band or narrow band Surface Acoustic Wave (SAW) filters. The board has about 10 dB of loss.

Output from the previous amplifier feeds through a 50 ohm coaxial cable to a 4 dB pad composed of R64, R65 and R66. This pad provides a stable source impedance for the 24 MHz bandpass filter. The 24 MHz bandpass filter rejects undesired mixing products and supplements the SAW filter. The 24 MHz bandpass filter has about 1 dB of insertion loss.

The aural signal is taken from the junction of C71 and R82, and fed to the base of Q13. This transistor and Q17 form an operational amplifier with the output taken from the collector of Q17. Feedback occurs through C15 and R24. The output to the audio mixer is taken from transformer T29.

The video IF signal from the 24 MHz bandpass filter feeds through a 4 dB pad composed of R81, R82, and R83 to a switch that selects the narrow or wide band SAW filters. This pad provides a stable output termination for the 24 MHz bandpass filter.



The front panel SOUND TRAP IN button selects input to the narrow band SAW Filter. Under these conditions,  $-15\text{ V}$  is applied to R78. This action forward biases CR95, and back biases CR94 and CR97, preventing any IF signal from passing to the wide band filter. Diodes CR84 and CR88 are forward biased and CR83 is back biased. This allows the IF signal to pass to the narrow band filter.

When the SOUND TRAP OUT button is pressed,  $+15\text{ V}$  is applied to R78. This voltage back biases CR84, CR88 and CR95 and forward biases CR83, CR94, and CR97. This opens the narrow band signal path, shorts to ground the input to the narrow band filter, and allows the signal to pass to the wide band filter through the appropriate diodes.

### IF NYQUIST FILTERING

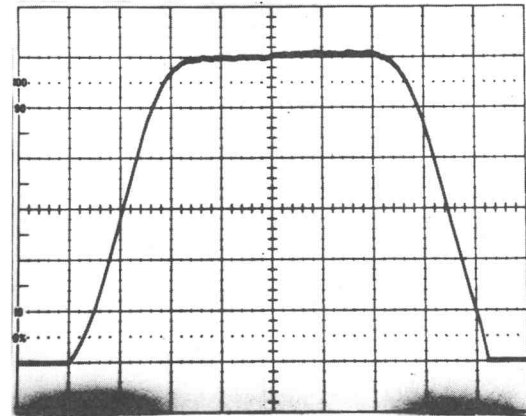
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#### IF SAW Amplifier Boards (A24 and A25)

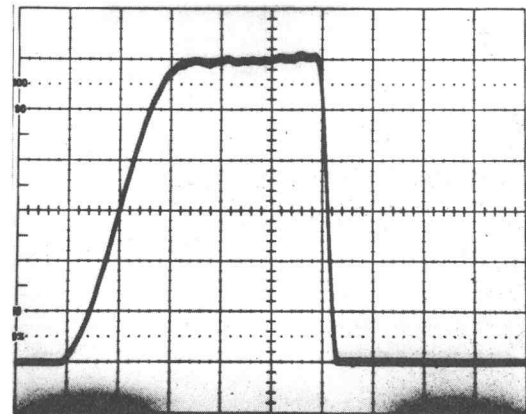
These boards precisely shape the IF bandpass, and add additional selectivity. This filtering is accomplished by SAW filters. The narrow band SAW filter (SOUND TRAP IN) is located on A24, and the wide band SAW filter (SOUND TRAP OUT) is located on A25. Each SAW filter has about 30 dB of insertion loss, and the Nyquist slope places the 24 MHz visual IF down another 6 dB. The amplifier on the board has about 30 dB of gain, giving a stage gain of 0 dB in the middle of the passband and  $-6\text{ dB}$  at the 24 MHz visual IF.

The IF frequency passes to the wide or narrow band SAW filter as selected. The filter circuits are identical to each other except for the frequency response of the SAW filter elements and several minor component value changes. SAW filters are piezoelectric crystals through which electrical signals are converted into surface acoustic waves. They are relatively small devices and require no tuning or maintenance. Their bandpass and group delay characteristics are very precise. Figure 3-4 shows the typical bandpass characteristics of the SAW filters.

Transistors Q97 and Q85 form operational amplifiers. Feedback occurs through R93, the gain adjustment, and R97. The operating bias is set by R76. The wide or narrow band filter amplifier not used is biased off. When the narrow band filter is selected, R52 and the cathode of CR78 is at  $-15\text{ V}$ . Transistor Q52, located on the IF Interface board (A32), is off and CR78 on the narrow filter board, is conducting. With no emitter return path, Q97 and Q85 in the wide-band filter are inoperative. The switching line goes to  $+15\text{ V}$  if the sound trap is switched out. This opens the emitter return path for Q97 and Q85 in the narrow band filter and causes Q52 to conduct, thus providing an emitter return path for Q97 and Q85 in the wide band filter. Power to the unused amplifier is turned off, as just described, to improve the signal isolation through the switch and unused amplifier.



(a) Wide



(b) Narrow

2200-23

Fig. 3-4. Typical Bandpass Characteristics of the SAW Filters.

The output from these amplifiers is taken from the collector of Q85. The ac collector load, composed of C90 and R90, is test selected to obtain the correct SAW filter bandpass tilt. The signal feeds to a unity gain, low output-impedance, feedback amplifier composed of Q87 and Q71. The amplifier output voltage is doubled by transformer T55 and drives the SAW filter. The source impedance provided at the output of T55 is about 10 ohms. Adjustable inductor L52 neutralizes the input capacitance of the SAW filter.

The SAW filter passband shifts with temperature. Diode CR18 senses the temperature of the wide band SAW filter. The temperature coefficient of this diode is  $-2.2\text{ mV/degree C}$ . Temperature coefficient of the SAW filters is about  $-90\text{ ppm/degree C}$ . The diode voltage drop is sensed, and the frequency of the Converter Local Oscillator shifts to maintain the 24 MHz Visual IF signal precisely at the correct point on the Nyquist slope of the SAW filters.

**IF Post Amplifier (A26)**

This circuit amplifies the signal from either the wide or narrow band filter sufficiently to drive the next stages. The Post Amplifier output goes to the IF Zero Carrier-Phase Shifter board (A27), and also drives the Limiter board (A55). There is an analog gain control in this circuit, controlled by the fine agc circuit, that has about a  $\pm 0.7$  dB range. The stage gain for this board is about 27 dB.

The wide band filter outputs to the emitter of Q13 and the narrow band to the emitter of Q23. These transistors operate as common base amplifiers with a current summing point and virtual ground at the junction of R21 and C22. The dual common base isolation stages prevent SAW filter bandpass characteristics from interacting with each other. Damping for spurious oscillations is accomplished by ferrite beads, E13 and E23, in the base circuits.

Transistors Q33 and Q53 form an operational amplifier with feedback through C52, R41 and R32. Gain for this amplifier is adjusted by R41. The operating point is adjusted by R64, which supplies emitter current to Q53. Ferrite bead E33 serves to suppress oscillations in this stage.

The fine automatic gain control inputs current at pin 5 from the Pin Drive Decoder on A60. This current varies the conduction of CR56, a PIN diode. With increasing current through CR56, R53 is effectively shunted for ac currents through C58 and C55. This increases the ac current through Q53 and consequently the gain of this stage. The PIN diode current path is through R58 to the  $-15$  V supply. Transistors Q71 and Q81 operate in a similar manner to Q71 and Q82 located in the SAW drive amplifier on A24 and A25. Output is taken at a low impedance point at the collector of Q81. R87 and R96 provide 50 ohm source impedance, and feed the IF Zero Carrier/Phase Shift circuitry on A27, and the Limiter circuit on A55.

**IF DETECTION****IF Zero Carrier Switch/Phase Shifter Board (A27)**

This circuit provides a means of shutting off the IF signal to establish a zero carrier level for modulation percentage checks. Another part of this circuit splits the IF signal into two paths, phase shifts the two signals precisely by 90 degrees over the full bandwidth, and equalizes the delay between the two paths. One output feeds an in-phase 24 MHz IF signal to the video detector, and the other output feeds a quadrature phase 24 MHz IF signal to the quadrature detector. The output impedances are 100 ohms. The IF signal is reduced by about 14 dB between the input and each of the two outputs (into 100 ohms).

The IF signal is turned off during the time of the zero carrier pulse. The signal turning the carrier off comes from the Zero Carrier Timing circuitry shown on schematic 11. A TTL high is applied to the base of Q58 during zero carrier time, switching Q58 off. With Q58 off, the junction of R55, R66 and T65 goes negative, back-biasing diodes CR53, CR66, CR84 and CR85. This action prevents the IF signal from passing to T55 from T94. Potentiometer R72 adjusts current through both diode signal paths so that equal switching signals flow to both inputs of T55, minimizing switching transients. When off, this switch provides about 55 dB of signal isolation.

Delay is introduced by L89, C88, C95 and L98 and by networks directly supplying the IF signal to the video and quadrature detectors so that the signal supplied by the limiter, for envelope detection, arrives at the detectors at the same time.

Output from the zero carrier switch passes through a network composed of L48 and C55 to the video detector. This network provides a uniform 10 ns of delay to the video IF carrier and sidebands.

The output from the zero carrier switch is also fed to the quadrature detector through a network consisting of C31, L21, L25, C27, L13, C03, and C10. L13 is used as a coarse adjustment, and C10 is a fine adjustment that is accessible without using an extender board. This filter has a bandpass from about 22 MHz to 30 MHz with relatively flat amplitude response. The output from this filter, to the quadrature detector, is the carrier frequency delayed by 10 ns with no phase shift and sidebands that are shifted in phase depending on frequency.

The resulting signal outputs of both filters are identical in amplitude and shifted in phase by 90 degrees. The impedance looking into the detectors is approximately 100 ohms.

**IF Detector/Video Amplifier Boards (A28 and A29)**

These boards convert the 24 MHz IF signal to baseband signals, filter any unwanted outputs from the converter, and amplify the resulting signal. Circuit board A28 provides the quadrature signal to the phase-lock circuit and to the QUADRATURE OUTPUT port. Board A29 provides the video output signal to the AGC circuit and to the two VIDEO OUTPUT ports. Power gain of this stage is about 23 dB for 100 ohms input and 75 ohms output impedances. (If measured with 50 ohm source and load impedance test equipment, the apparent gain will be 0.7 dB less.)

As both detectors, with the exception of input phase and output signal, are identical the following discussion covers both circuits. Both detector circuits operate as product detectors, and provide envelope or synchronous detection depending on the signal driving the local oscillator source.

The signal from the limiter (envelope detection) or the local oscillator, controlled by the transmitted carrier (synchronous detection), is fed to the balanced demodulator, U14, through T27. See Fig. 3-5. Input impedance to T27 is about 100 ohms. The output of T27 drives U14.

The IF signal passes to the demodulator through transformer T09. Input balance for the demodulator is accomplished by R11 and associated components connected to  $-15\text{ V}$ . Pins 1 and 4 of U14 provide proper dc bias for the circuit. The output at pins 9 and 6 of the video detector is a full-wave rectified (envelope or synchronous) IF signal. The main signal components are baseband video and modulated 48 MHz. Transistors Q11 and Q20 operate in a grounded base mode, and are housed in a common heat sink for thermal compensation. They provide constant voltage at pins 9 and 6 of U14. This assures constant power dissipation so that U14 switches consistently at the same point with respect to the driving waveforms.

Transistors Q21 and Q31 form a current mirror. Current flowing in the collector of Q31 is inverted by Q21 and added to the signal from pin 6. The result is a signal at the collector of Q20 with twice the amplitude of either signal at the output of U14. The emitter resistors, R40 and R43, of Q21 and Q31 are selected to compensate for any dc unbalance in the demodulator circuit due to temperature.

Output from the demodulator is fed to the low pass filter composed of L44, L54, and L64, along with associated capacitors. Inductor L64 and C66 form an all pass section, providing group delay compensation. The filter passes frequencies below about 10 MHz, but is phase equalized to about 15 MHz. The signal is amplified by Q71, Q81, Q83, and Q86. Transistors Q81, Q83, and Q86 form an operational amplifier. Transistor Q71 provides temperature compensation for Q81, which operates as a grounded-base stage. The collector of Q81 drives Q83, which drives emitter follower Q86. Feedback occurs through R83.

In the synchronous detection mode, the quadrature output signals, when terminated in 75 ohms, are 0 V at dc and up to 700 mV peak to peak for frequencies above about 1 MHz. The quadrature output is 0 V in the envelope detection mode. The video output signal, into 75 ohms, is about 1 V maximum with the blanking level at 0 V and zero

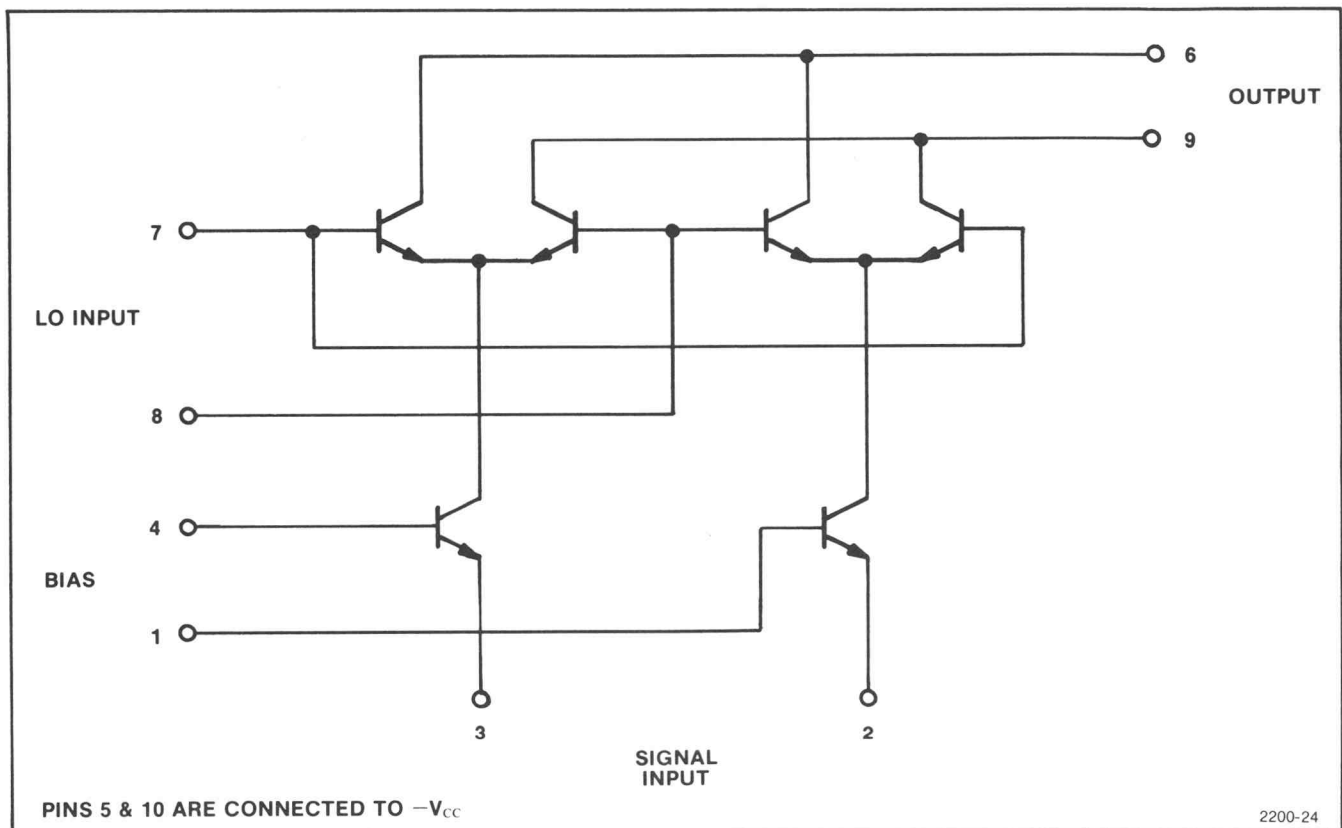


Fig. 3-5. Internal Schematic of the Balanced Demodulator IC as Used in the Video and Quadrature Detectors.

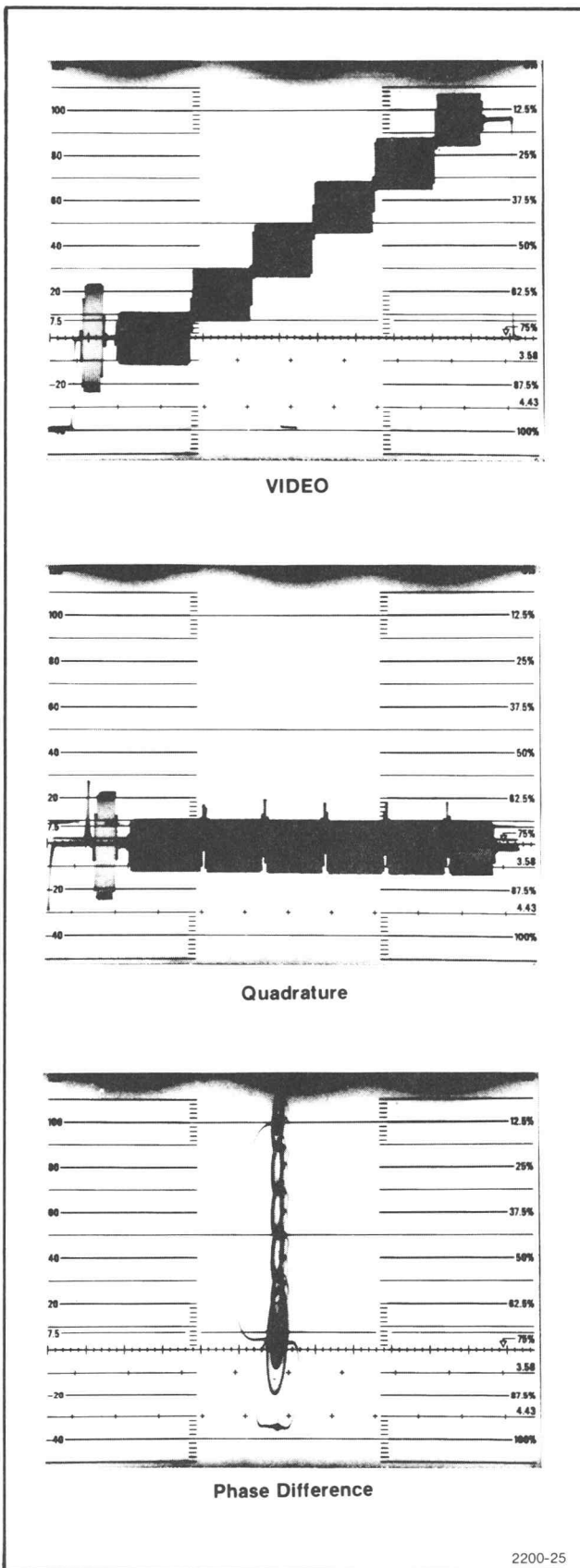


Fig. 3-6. Relationship of the Video and Quadrature Outputs.

carrier level at 0.857 V. See Fig. 3-6. As the boards are identical, placing the Quad-Video jumper in the respective position changes the dc level of the output amplifier, and makes these boards interchangeable for test and troubleshooting purposes.

## PIN DRIVER

5

and

5a

### General

The PIN Driver circuits (A30-A31) are controlled by the agc circuit, and set the currents that drive the PIN diode attenuators. The board input is a 5 bit parallel binary signal. Three Programmable Read Only Memories (PROM) transform the 5 bit input code into two 12 bit parallel binary signals that switch two sets of binary weighted current sources. The current sources drive the series and shunt diodes in the PIN diode attenuators on A21 and A22. (See Fig. 3-7.)

The desired effect is to have the PIN diode attenuator change its attenuation in equal steps when required by the agc. Nonlinearity of the PIN diodes is compensated for by programming the PROM outputs to switch the correct amount of current from the current sources to the attenuator. This results in 32 levels of attenuation that are separated by 0.7 dB each. To achieve this accuracy, the PROM must be specially programmed for the individual PIN diode characteristics. This is done by inserting a PROM simulator into the PROM sockets, determining the correct program for each step, and programming the PROM.

### NOTE

*To maintain the accuracy should a PIN diode or PROM fail, we recommend that the instrument be returned to Tektronix for repair and recalibration of this circuit. (See the Maintenance section of this manual for further information.)*

### PROM

The PIN Driver PROM (U44, U64, and U14) each have 256 memory locations. Each memory location may be programmed as a binary "1" or "0". The memory is formatted in 32 words (or bytes) of 8 bits each. The 5 bit input to the board is fed to address lines A0 through A4 of each PROM. All combinations of the input signal (2 to the 5th power) account for the 32 input address locations.

The memory of U64 is shared between U44 and U14 to get the 12 bit binary output required to drive the current sources. The shunt memory output consists of U44 (B0 through B7) and U64 (B0 through B3). The series memory output consists of U64 (B4 through B7) and U14 (B0

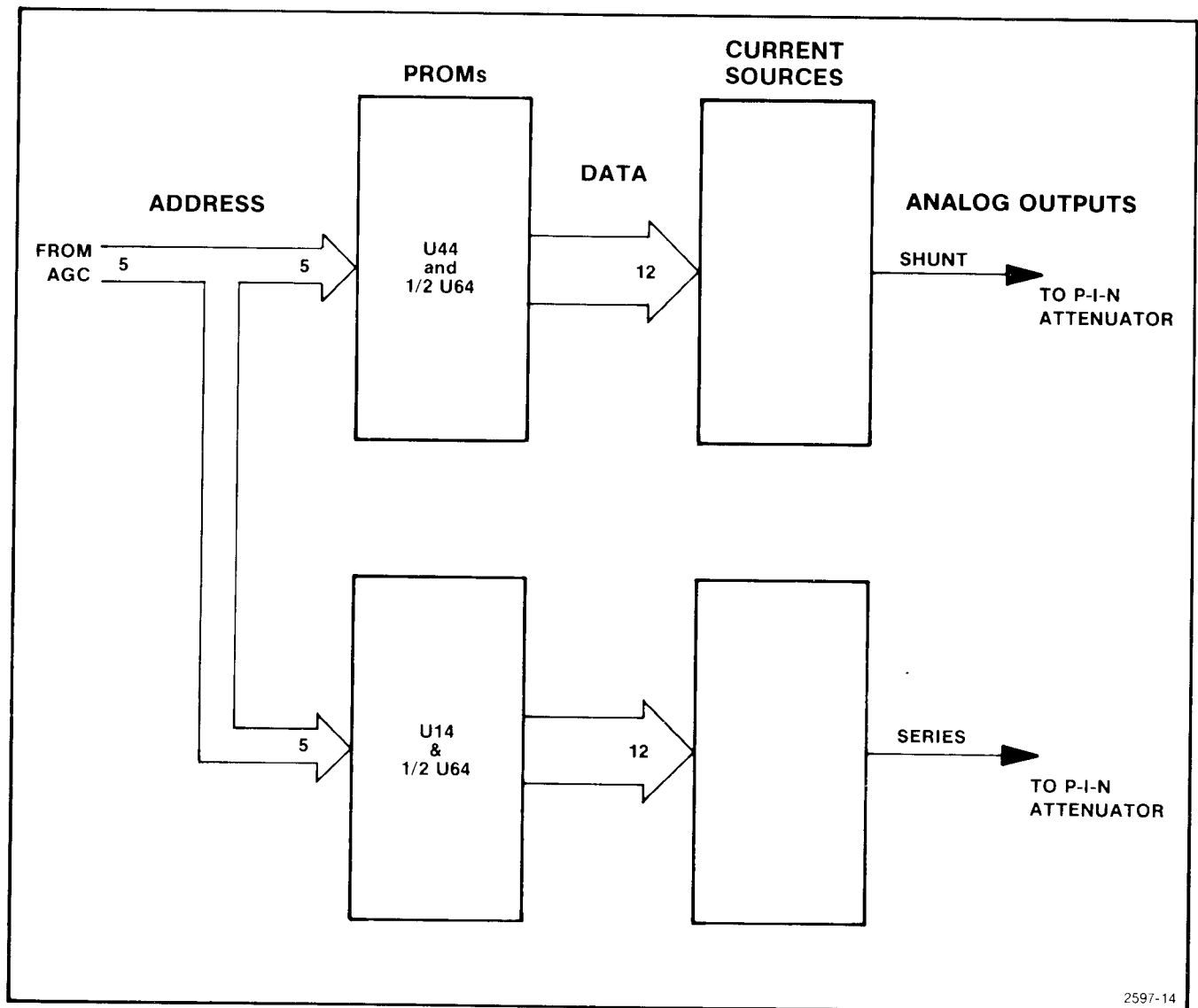


Fig. 3-7. PIN Driver Block Diagram.

through B7). This gives a possible 4096 (2 to the 12th power) output codes to choose from in programming the PROM to drive each of the current sources.

#### Current Sources (see Fig. 3-8)

There are two sets of current sources. They provide shunt and series currents for the RF PIN Attenuator (A3). The shunt sources are the upper row of transistors and resistors shown in the schematic. The series sources are shown in the lower row.

Resistors R93 and R92 form a voltage divider at the base of Q81. Transistor Q81 provides temperature compensation, and sets the level at the bases of all the current source transistors. When a current source is switched on, its emitter voltage is the same as that at the base of Q81. This

makes the current through the transistors dependent upon the value of the emitter resistors. The collectors of each set of current source transistors are connected together, thus summing the currents at the outputs. The series current output is at P08-1, and the shunt current output is at P08-2.

The current sources are binary weighted. The smallest current available is from Q19 in the shunt circuit, and Q80 in the series circuit. This can be considered as a reference current ( $I_r$ ) for this description. The smallest current source then supplies  $I_r \times 1$ . The next larger current source supplies  $I_r \times 2$ , the next  $I_r \times 4$ , and so on. This progression of powers of 2 continues for the twelve current sources, so that the largest current available from a single source is  $I_r \times 2048$ . If all current sources in one set were on at once, the total current available would be  $I_r \times 4095$ . Therefore, there are 4096 (0 included) possible currents to choose from to drive the PIN Attenuator.

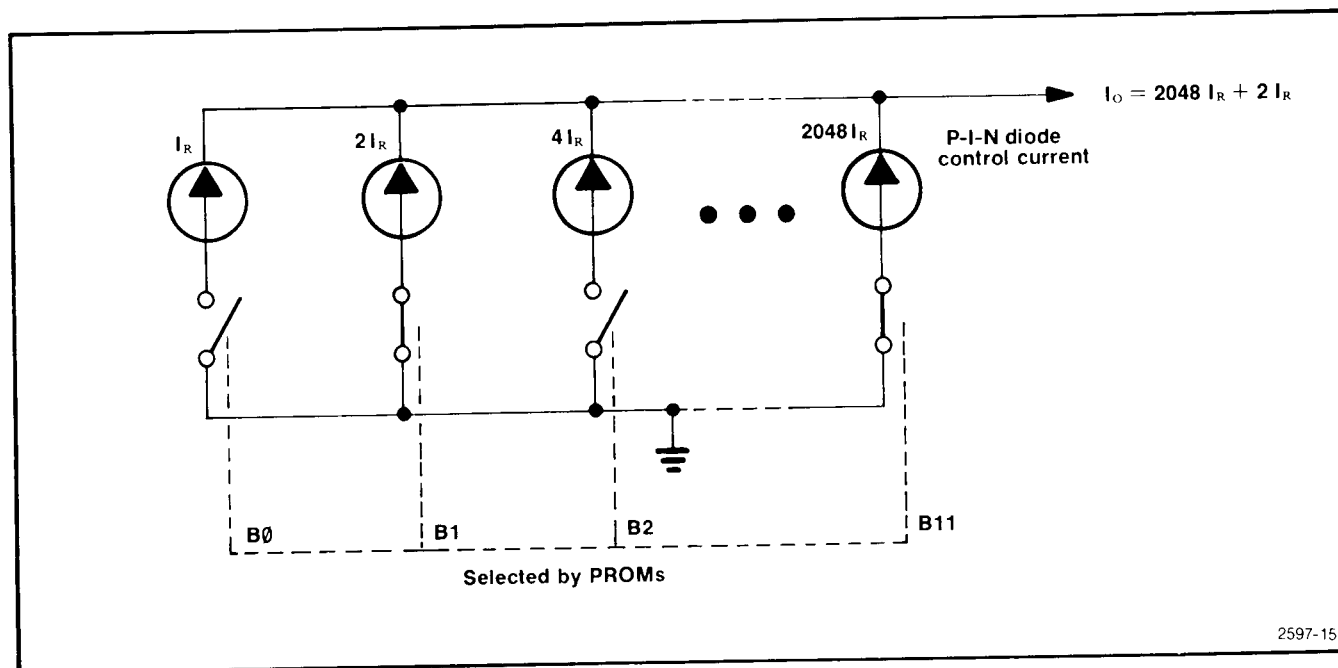


Fig. 3-8. Simplified Schematic of PIN Driver Current Sources.

The current sources are switched on when the corresponding PROM outputs are high. The high current sources, Q188 and Q10, are switched by transistors Q89 and Q100 respectively. When the PROM MSB (Most Significant Bit) is high, the current through the emitter resistor passes through the current source transistor to the output. When the MSB is low the source transistor is turned off, and the current is shunted by the switching transistor. This keeps a large amount of current from sinking in the PROM if all outputs should be low. The smaller value current sources are switched by diodes connected between the PROM and the current source emitters.

### Q-P FILTER 5

#### Quasi-Parallel (Q-P) Filter Board (A45)

The Quasi-Parallel Filter board (Q-P board) consists of two buffer circuits and a balanced sideband Chebyshev filter, which is used to preserve the integrity of the signal passing through it.

The input to the Q-P board is the AURAL signal from pin 2 on the IF Switch/Aural Drive board (A23). This signal is fed into the base of Q87. This transistor and Q86 form a buffer operational amplifier with feedback occurring through C86 and R95. The outputs are taken from both the emitter and the collector of Q86. The output from the emitter is

sent to the Audio Interface board (A44) and the output of the collector goes to the Q-P filter. The Q-P filter consists of L70, L50, L30, and L01 and their associated components. The output of the Q-P filter is a 24 MHz signal which is sent to the Limiter board (A46).

At the input to the Q-P filter is a buffer circuit (Q91). This circuit is only used when the filter is tuned to allow for more accurate tuning.

#### Q-P Limiter Board (A46)

This circuitry picks off the IF signal at the output of the Q-P filter and eliminates any amplitude modulation. The output is essentially a square wave at the 24 MHz visual IF rate. Any frequency or phase modulation of the RF visual carrier will appear on this signal.

The limiter is essentially four stages of emitter coupled amplification and limiting. The four pairs of amplifiers are: Q15 & Q22, Q35 & Q43, Q55 & Q62, and Q75 & Q92. Current for these transistor pairs is provided by four sets of transistors: Q02 & Q21, Q32 & Q41, Q52 & Q60, and Q81 & 90.

The first amplifier pair is driven by Q09, operated in a grounded base configuration for isolation purposes. The inductors in the emitter circuit provide the necessary peaking. Power supply

isolation is provided by L17 and C14 and other associated components connected in a similar manner.

Both constant current transistors in each stage supply equal current to each half of the amplifying transistor pairs. Limiting action takes place as the signal current exceeds the emitter bias current. The amplifier pairs are capacitively coupled to ensure precise switching at zero crossing. The delay through this circuit is adjusted by the potentiometers connected to the bases of the constant current transistors. This delay is set for the best video-to-aural crosstalk in the Quasi-Parallel mode. Overall circuit gain is about 80 dB.

## AUDIO INPUT

### First Audio Mixer Board (A40)

This board converts the aural IF from about 28.5 MHz to 4.5 MHz. The board also allows switching between an external Aural Inter-carrier signal and the internal 4.5 MHz aural IF, and provides a 28.5 MHz detector for an aural alarm circuit.

The IF signal is applied to the 28.5 MHz bandpass filter. This filter, tuned 4.5 MHz above the 24 MHz IF picture carrier, eliminates most of the video information present. After filtering the signal goes to the first audio mixer and to the alarm circuitry.

Transistor Q72 amplifies the sound carrier to drive Q84. These transistors are configured as an operational amplifier. Transistor Q84 has a parallel tuned circuit as a collector load. If the aural carrier is present, the collector of Q84 develops a voltage which is rectified by CR96, causing a negative voltage to appear at pin 2 of U88. Amplifier U88 is biased by CR85 and zener diode VR98 so that the output at pin 6 is TTL compatible. The negative DC voltage at pin 2 of U88 causes the output (pin 6) to go high, which indicates to the alarm circuitry that an aural carrier is present. Should the carrier disappear, pin 2 of U88 will go high, causing a low at pin 6 which activates the alarm circuitry.

The IF signal is applied to demodulator U12 through T31, which converts the single ended IF input to

double ended output. DC bias for the input of U12 is provided by R21 and R22. The local signal either from the limiter (Inter-carrier), the phase locked local oscillator (Split), or the quasi-parallel filter (Q-P) is input at T19. This transformer provides single-to-double ended conversion, as well as impedance matching. Proper bias is provided by R01, R02, and R16. Inductors LR05, LR15, and LR19 impedance match the input.

The resultant 4.5 MHz aural inter-carrier output from U12 is taken single ended at pin 9. This output feeds to the diode switch circuit. The rear-panel AURAL INTERCARRIER IN feeds through CR49 to common base amplifier Q46. Diode CR49 provides temperature compensation for Q46. The output of Q46 feeds the diode switch circuit.

Diodes CR25, CR26, CR36, and CR45 form a switch to select either the external or internal aural inter-carrier. With S04 in the external position, +15 V is applied to the cathode of CR45 and the anode of CR25. This action causes CR25 to conduct, shorting the internal signal to ground and back biases CR26, preventing the internally-generated sound carrier from passing to the Second Audio Mixer board (A41). Diode CR45 is back biased and R36 passes the external aural inter-carrier signal. In the internal position, CR45 and CR26 are forward biased and CR36 and CR25 back biased. The internal signal passes to the Second Audio Mixer board (A41).

### Second Audio Mixer Board (A41)

This board converts the 4.5 MHz signal to about 1.01 MHz. An Aural Inter-carrier Output amplifier is also included on the board.

Transformer T17 serves as a 4.5 MHz bandpass filter and single-to-double ended converter. Input bias for amplifier U11 is provided by R12, R14, and R22 connected to -15 V. This amplifier is a dual differential pair and provides enough gain to drive demodulator U51. The output from U11 also drives T31 which serves as a 4.5 MHz bandpass filter and a double ended-to-single ended converter. The output of T31 drives Q36, a grounded base amplifier, which in turn drives emitter follower Q44. The emitter of Q44 drives the rear-panel AURAL INTERCARRIER OUT jack.



## Theory of Operation—1450-1

Transistor Q70 serves as the 5.510 MHz local oscillator for conversion of the sound carrier to 1.01 MHz. The 5.5 MHz oscillator is a Pierce or crystal type Colpitts. The IF signal and local oscillator outputs are mixed in U51 and the output is fed to the Audio Limiter board (A42).

### Audio Limiter Board (A42)

This board filters the second audio mixer output, and limits the signal to a fixed amplitude.

The signal from the Second Audio Mixer drives a 1 MHz bandpass filter. The filter is composed of L95, L75, L55, and L45 and associated components, and has a Butterworth response characteristic. The output from this filter feeds U15, an amplitude limiter, which provides up to 60 dB of limiting. The differential output of U15 is converted to single ended output by T18.

## AUDIO OUTPUT

7

### Audio Discriminator Board (A43)

The circuits on this board include a limiting amplifier, a pulse count discriminator (FM detector), and an Automatic Frequency Control circuit for the Aural Only mode of operation.

1.01 MHz Aural IF from the Audio Limiter board (A42) is a 50% duty cycle square wave, with the frequency shifting according to the modulation. This signal drives a limiting amplifier (Q19 and Q18). In the limiting amplifier, emitter follower (Q19) switches common base stage (Q18) if the signal is above threshold. Zener diode VR12, resistor R03, and capacitor C12 form a +5 V supply for these transistors and the pulse count discriminator.

The pulse count discriminator converts the 1.01 MHz Aural IF signal to audio. The discriminator consists of a pulse forming circuit (Q08 and Q13), a common base switch (Q14), and a lowpass filter. Fig. 3-9 shows the waveforms found in the discriminator circuit.

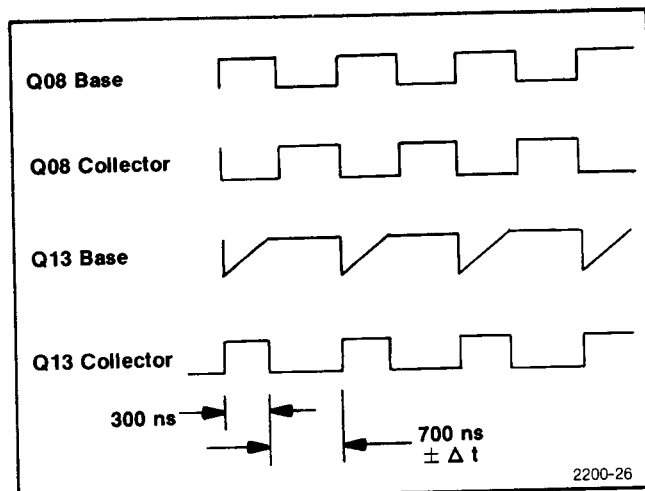


Fig. 3-9. Waveforms associated with the pulse count discriminator.

The pulse forming circuit converts the 50% duty cycle signal to a signal with the duty cycle proportional to frequency. Transistor Q08 is switched on and off at the Aural IF rate. When the collector of Q08 switches from +6 V to 0 V, Q13 is driven off by the timing capacitor (C05). Capacitor C05 charges through R02 at a time constant such that after 300 nanoseconds, the base of Q13 reaches a level to saturate. This forms a 300 nanosecond pulse at the collector of Q13.

Each 300 nanosecond pulse diverts current through R11 from Q13 to Q14 and on to R43. The average current through R43 is proportional to the number of pulses during that time. Since the number of pulses changes with frequency deviation, the average voltage developed across R43 varies in proportion to it.

The output of the pulse count discriminator feeds a 200 kHz lowpass filter composed of L41, L61, and associated components. This filter removes the 1.01 MHz carrier components, leaving the audio. The output of this filter is terminated by R63 which is the input to the operational amplifiers.

The first amplifier is U85B and it provides about 6 dB of gain for the rest of the amplifiers. The signal then splits and flows through two sets of amplifiers: a wideband and a narrowband. The wideband amplifier, U85A, supplies gain for the DEVIATION OUT and the 600Ω Balanced Line. Potentiometer, R81, sets the gain for this stage's output. U81A and



U84B, along with their associated components, form the narrowband amplifier, which supplies gain to the 8 $\Omega$  Speaker output and the headphone jack. The gain is adjustable by R71. Jumper P65 can change this amplifier setup so that all of the audio outputs only have narrowband capabilities. This mode of operation is not recommended because it effects the DEVIATION OUT in addition to 'normal' audio channels. If the narrowband mode of operation is desired for the 600 $\Omega$  Balanced Line, jumper J54 on board A44 should be moved instead.

The collector of Q14 also feeds U58. This operational amplifier has a bandwidth of about one or two kilohertz. The output of U58 acts as an automatic frequency controller by shifting the frequency of the converter local oscillator so that, in the Aural Only mode, the sound carrier remains in the IF passband.

#### Audio Interface Board (A44)

This board provides intercircuit connection for all the plug-in audio circuit boards, it also contains the de-emphasis circuit, a notch filter, and two audio output amplifiers.

The output from the high gain amplifier on the Audio Discriminator board (A43) feeds the rear-panel DEVIATION OUT connector and the de-emphasis circuit. R68 and C69 have a time constant of 75 microseconds, and may be switched in and out from the front panel. If the de-emphasis circuit is switched in the capacitor, C69 is connected to ground, otherwise it is left open. The de-emphasis network is a lowpass filter that has a 3 dB down point at 2.12 kHz, and attenuates the audio at 6 dB per octave. This de-emphasis curve compensates for the pre-emphasis curve at the transmitter. Pre-emphasis improves the signal-to-noise ratio at the higher audio frequencies.

After de-emphasis this signal enters a unity gain buffer amplifier (U45). This buffer provides a very stable signal to the notch filter (when it is selected). The notch filter is a bandstop filter for 15.734 kHz. By using this filter the stereo pilot tone is removed from the signal. After filtering, the signal flows through a second unity gain buffer amplifier (Q28 and Q29). This buffer prevents interference from the AUDIO LEVEL potentiometer from bleeding backwards into the circuit.

The audio signal is input through the AUDIO LEVEL control (P29) on the front panel. The signal then drives Q24A, part of a differential amplifier with Q24B. Field effect diode CR16 acts as a constant 1.2 mA source for Q24A and B. The collector of Q24A drives a complementary symmetrical paraphase amplifier (Q27 and Q46). Voltage divider R36, R35, and CR28 supply the base voltage for Q46. Diode CR28 provides temperature compensation for base emitter voltage changes in Q27 and Q46. The output transistors (Q65 and Q67) are complimentary Darlington types. These transistors provide sufficient current gain for the required output power, with very low distortion of the signal. Transistor Q66 acts as a base emitter voltage multiplier. This transistor is mounted on a common heat sink with the Darlington transistors. This provides excellent temperature compensation and prevents thermal runaway in the output transistors. The AUDIO OUTPUT jack is wired to accept either stereo or mono type headphones. Note that the output from the jack is only a monaural signal.

The output from the high gain amplifier on the Audio Discriminator board (A43) also feeds the Wideband Audio Out circuit when it is in the wideband mode (otherwise it gets its signal from the output of the de-emphasis circuit). This signal is fed into U45 which is a gain compensation stage. The signal then flows into a pair of amplifier circuits, one for each side of the 600 $\Omega$  Balanced Line Output. The operational amplifiers (U44A and U44B) provide no gain but act as buffers and stabilizers by providing a feedback path. The two transistor pairs (Q63 & Q64 and Q61 & Q62) are current boosters and provide enough power to meet the 600 $\Omega$  output's needs. The sets of diodes before the transistors act as current limiters to prevent overdraw and damage to the transistors, while the sets of diodes after the transistors act as static protectors.

There are two internally selectable jumpers on the Audio Interface board, J54 and J47. J54 allows the output of the 600 $\Omega$  balanced line to be either wideband or narrowband by passing the signal through lowpass filters. J47 allows the user to insert a notch filter in the headphone and speaker outputs to attenuate the stereo pilot tone. The notch filter has the characteristics given in Fig. 3-9a and consists of C59, R67, R48, C37, C38, and R59. It is shipped from the factory in the out position.

## IF REFERENCE OSCILLATOR and PHASE SHIFTER

### Reference Control Board (A50)

The 24 MHz reference oscillator and control circuitry provides the locally generated signal for use in the IF, synchronous detector, and aural converter.

The 24.25 MHz crystal oscillator is composed of transistor Q02 with associated components. As the crystal operates in an overtone mode, L13 and C03 assure operation at the correct overtone. The output from the collector of Q02 drives mixer U23 at pin 8.

The output of the reference oscillator drives mixer U23 at pin 2 through emitter follower Q35. Resistor R36 terminates the reference oscillator input.

The voltage controlled oscillator is designed to operate at nominally 24 MHz, 250 kHz below the crystal oscillator. The circuitry will accommodate a frequency difference from -50 kHz to -500 kHz.

The mixer output is at pin 6 of U23. When the circuitry operates at design center the frequency at pin 6 of U23 is about 250 kHz, the difference frequency between the voltage controlled and crystal oscillators.

The signal passes from pin 6 of U23, through a low pass filter composed of L52, L62 and associated components, to the base of Q70. This transistor pair, Q70 and Q80, form a Schmitt multivibrator. The signal at the collector of Q80 is essentially a square wave with an amplitude of approximately 6 V peak to peak. Transistor Q80 either saturates or the collector is clamped by CR91 in the most positive direction. During each cycle, C85 charges through CR85, and discharges through Q87. The current (charges-per-second) from the collector of Q87 is proportional to the difference frequency. The current through Q87 always matches the current through Q88 when the voltage controlled oscillator frequency is stable.

The current through Q88 is determined by the temperature of the wide band SAW filter as sensed by CR18 on the A25 Filter board, and by the setting of R40 and R50 (Wide Band and Sound Trap adjustments). The voltage from CR18 varies at -2.2 millivolts/degree C. A temperature increase causes pin 5 of U56 to move in the negative direction, which increases current through Q88 to lower the frequency of the voltage controlled oscillator. This action matches the change in SAW filter center frequency, which decreases with temperature at the rate of 90 parts per million per degree C.

When the voltage controlled oscillator frequency decreases, the frequency of the signal at pin 6 of U23 increases, causing an increase in average current through Q87.

Transistor Q92 and associated components form a +6 V power supply to provide voltage for CR91 and several other points in this circuitry.

### Reference Oscillator Board (A51)

The circuitry on this board generates the 24 MHz reference signal. This signal is used in the phase lock circuits, and also functions as the local oscillator (LO) signal for the video and quadrature detectors in the synchronous detection mode, and as the LO for the first audio mixer in the SPLIT audio mode.

Transistor Q22 operates as a Clapp oscillator. The tank circuit consists of L03, C07, C08, CR09, C13 and C16. Inductor L03 is adjusted to center the oscillator frequency. The control voltage from the Reference Control board (A50) sets the capacitance of varactor CR09 to produce the oscillator frequency control required for lockup.

Transistor Q16 is in series with the emitter of Q22 at dc and low frequencies, and operates as one half of a differential pair, with Q22, at higher frequencies. This assures that Q22 switches at the signal zero crossings, and effectively eliminates the second harmonic from the oscillator waveform. Power supply noise is removed by Q35. The oscillator signal from Q22 feeds Q32. These transistors form a cascode amplifier.

Transistor Q16 is in series with the emitter of Q22 at dc and low frequencies, and operates as one half of a differential pair, with Q22 at higher frequencies. This assures that Q22 switches at the signal zero crossings, and effectively eliminates the second harmonic from the oscillator waveform. Power supply noise is removed by Q35. The oscillator signal from Q22 feeds Q32. These transistors form a cascode amplifier.

The filter connected to the collector of Q32 is tuned to 24 MHz to attenuate any remaining harmonics. The filter output drives the base of Q72 which, in conjunction with Q74, forms a unity gain isolation-distribution amplifier. The addition of Q74 lowers the output impedance, raises the input impedance, and lowers harmonic distortion. This amplifier provides the Reference Oscillator signal to the Reference Control board (A50), the Converter Phase Lock board (A53), and through the Phase Lock Switch board (A58) to the 1st Audio Mixer board (A40). Diodes CR47 and CR48, in conjunction with the Phase Lock Switch board (A58), provide switching, with a constant load impedance, of the Reference Oscillator signal for the SPLIT mode of aural conversion.

### Phase Shifter Board (A52)

In the synchronous detection mode, the circuits on this board sample the output signal from the quadrature video detector, and shift the phase of the signal to the product detectors. This provides a stable phase adjustable reference frequency with adjustable reaction times for driving the product detectors.

A dc signal proportional to the difference between the picture carrier phase and the local regenerated carrier phase is applied to the drain of FET Q03. The source of Q03 connects through R13 to pin 2 of U22. Current may flow, depending on signal amplitude, through Q03 continuously in the front panel selected CONT mode, during the sync tip time (SYNC TIP mode), or during the back porch time (BACK PORCH mode). During the selected time, the emitter of Q17 goes positive. This action causes the collector of Q17 to go positive, which causes Q03 to conduct the phase error signal from the quadrature detector to U22. Neutralization for spurious switching components is accomplished by Q15, C01 and associated components.

When the envelope detection mode is selected, the base of Q18 goes negative ( $-0.7$  V). This action saturates Q18, causing the emitter of Q17 to go more negative, which causes the collector of Q17 to go toward  $-15$  V. This action turns Q03 off and prevents the quadrature phase error signal from passing to U22, a FET input operational amplifier.

Operational amplifier U22 operates as an integrator. The feedback capacitance is provided by C22 and capacitors selected through the SYNCHRONOUS TIME CONSTANT switch. The capacitor values depend on the reaction time selected. The value of the shunt capacitance is different for the continuous mode and the sync tip or back porch mode. This is necessary to maintain approximately the same loop bandwidth, as the error signal is passed to U22 only during sync or back porch time.

When switching to the envelope mode from the synchronous mode, the integrating capacitors maintain the output of U22 constant for some period even though Q18 has disabled the error signal. This prevents loss of phase adjustment and consequent video output disruption when rapidly switching from synchronous to envelope detection. Diodes CR32 and CR33 are protective diodes.

The voltage at pin 6 of U22 stabilizes at some value proportional to the quadrature error signal. This voltage drives the sine and cosine shaping diode arrays connected to mixers U81 and U84. The diode arrays cause the outputs at pins 6 and 9 of U81 and U84 to vary such that the reference oscillator signal is shifted in phase in proportion to the voltage at pin 6 of U22. See Fig. 3-10.

The reference oscillator signal drives U81 through a 20 dB attenuator composed of R82 and R92, and drives U84 through a 90 degree phase shift network (L98, C90, and C95) and a 20 dB attenuator (R64 and R84).

The mixers operate in the linear region at these low signal levels (around 50 mV). The outputs of U81 and U84 are summed at the primary of T58. The secondary feeds Q59, which provides isolation and gain. Transistors Q38 and Q37 operate as a unity gain isolation amplifier, with high input impedance and low output impedance.

## CONVERTER PHASE LOCK and DETECTOR LO SWITCH

### Converter Phase Lock Board (A53)

This circuitry compares the frequency and phase of the 24 MHz IF carrier signal to the 24 MHz reference oscillator signal, and adjusts the frequency and phase of the converter oscillator so that no difference exists between the 24 MHz signals. Signals from Q42 and Q32 provide the control voltage for frequency differences between the 24 MHz reference oscillator and the limiter output, via the converter oscillator, from about 500 kHz to about 100 Hz. When the frequency difference is less than about 100 Hz, the output from U13 provides the control voltage for the converter oscillator. Integrated circuit U03 provides the control voltage to the Converter Oscillator in the Aural Only mode.

The limiter signal from the Detector Local Oscillator Switch board (A54) is applied to pins 7 of U81 and U87. The 24 MHz reference oscillator signal is applied to the base of emitter follower Q95 and then to pin 2 of U81. Also, the 24 MHz reference oscillator signal is shifted 90 degrees in phase by L89, C79 and C99. From there it is applied through emitter follower Q94 to pin 3 of U87.

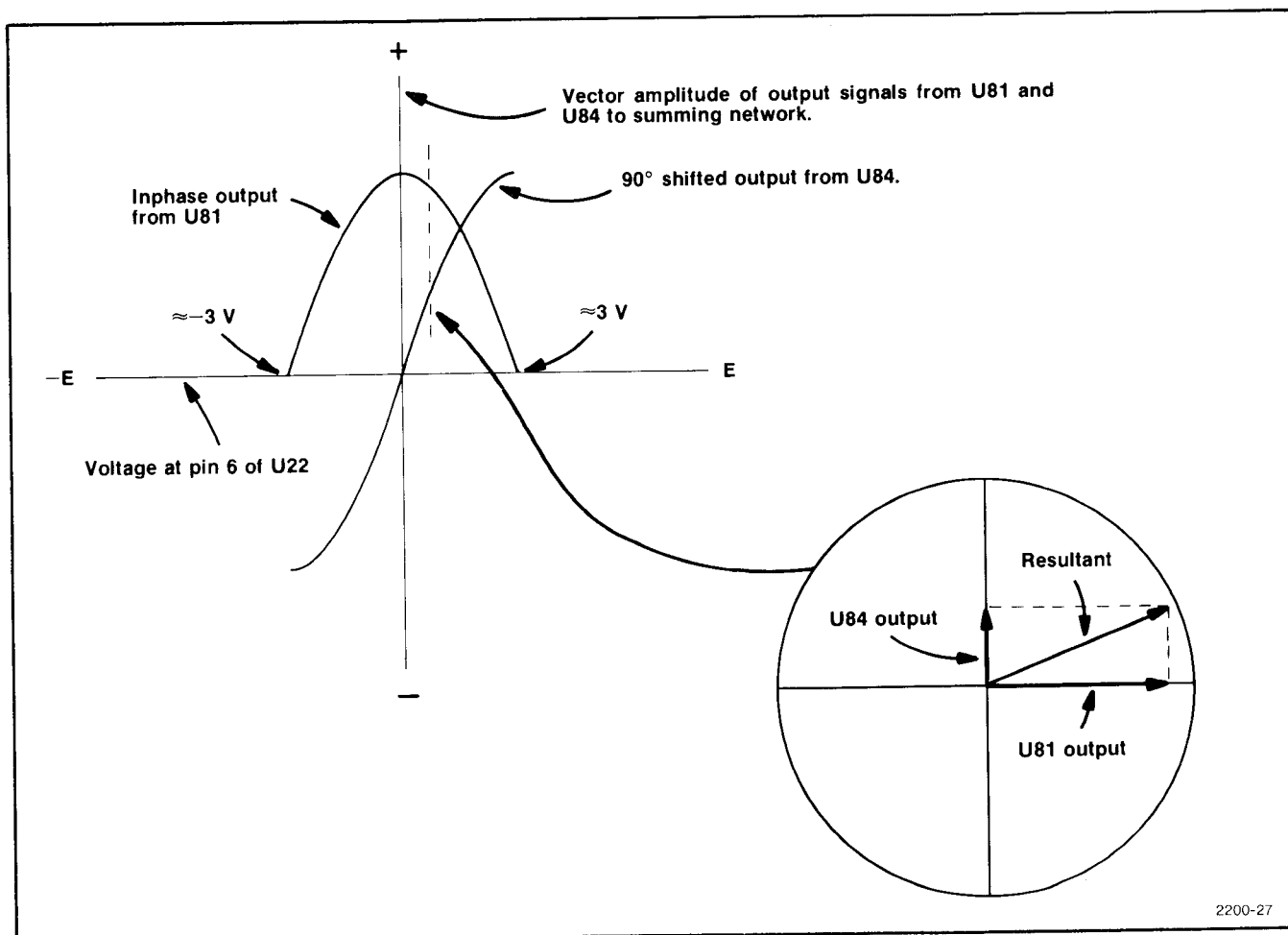


Fig. 3-10. Relationship of U22 (A52) Output Voltage and Phase of Local Synchronous Signal at Summing Network Output.

The differential output of U81, when phase locked, controls the frequency of the converter oscillator through U13. This differential signal is 0 V when phase locked, regardless of the converter oscillator frequency. The differential output of U87, when the loop is phase locked, is a dc voltage of about 1 V with pin 9 more positive than pin 6 (about +7 V and +6 V respectively).

When the loop is out of lock, the waveforms from the mixers are triangular in shape, about 1 V peak to peak (differentially about 2 V), at a frequency varying with the amount of phase and frequency difference of the 24 MHz reference oscillator and limiter outputs. The output of U87 is shifted 90 degrees from the output of U81. Outputs from both ICs pass through low pass filters. These filters remove color and sound carrier components.

The quadrature output from U87 passes to the input of U59A. No voltage appears across the input of U59A when triangle waves are present at the output of U87 because of the low pass filter, composed of R47, R48, and C57. As the circuit approaches lockup, the output of the mixers

becomes closer to direct current. Very close to lockup, pin 3 of U59A becomes more positive than pin 2. Thus, pin 1 of U59A goes positive, resulting in the following: pin 7 of U59B goes positive, opening the common emitter current path for Q45 and Q46, thus disabling the frequency lock; Q08 is switched off, allowing the back porch timing pulse to pass to the control input of U13; the UNLOCKED light is switched off; and the video detector is allowed to switch to synchronous detection, if selected.

When locked, the converter local oscillator is controlled through U13 by a dc signal at its input. A positive going voltage at pin 6 of U13 decreases the converter frequency, and a negative going output increases the frequency. When the circuit is not in lock, triangle waveforms pass through U13. These waveforms are averaged by C33 and have no effect on the frequency of the converter oscillator.

If the Converter Control board (A56) is removed, R23 provides a ground path for C33.

Integrated circuit U13 is a variable transconductance amplifier that samples continuously during unlocked time, and is gated during lock time. Continuous sampling while unlocked prevents the phase lock from side locking to a multiple of the sampling frequency. Amplifier U13 is gated during lock to prevent any composite video present at its input (due to incidental carrier phase modulation in the transmitter) from varying the converter oscillator frequency. When the circuitry is out of lock, the current flowing through pin 5 of U13 is about 5  $\mu\text{A}$  from R18 through CR19, providing relatively low continuous gain for U13. As the circuitry approaches lock up, Q08 turns off. This allows the positive going back porch timing pulse to gate the current to pin 5 of U13 between 150  $\mu\text{A}$  when the pulse is positive (increasing the gain by a factor of about 30), and 0  $\mu\text{A}$  (0 gain) during the low portion of the cycle. The average current to pin 5 of U13 is still 5  $\mu\text{A}$ .

The major frequency locking function is accomplished by combining the signals from Q53 with Q45, and from Q43 with Q46. The triangle waveforms driving the bases of these transistors cause them to switch at the midpoints of the triangles, forming square waves. Pins 9 and 6 are 180 degrees out of phase with each other for both U81 and U87, and the outputs from U87 are shifted 90 degrees from those of U81. The output from Q50 is inverted by Q43 so that the gating signals at the emitters of Q42 and Q32 are in phase.

The waveforms at the collectors of Q45 and Q46 are differentiated by C44 and C45, and combined with the gating signals from the collectors of Q43 and Q53. The phase of the gating signals from Q43 and Q53 changes 180 degrees ( $\pm 90$  to  $\mp 90$ ) from the phase of the differentiated spikes, depending on whether the 24 MHz limiter output-frequency (IF picture carrier) is above or below the reference oscillator. The leading edge of the differentiated pulse is always delayed 90 degrees from the leading edge of the gating waveform.

If, for example, the limited picture IF is above the reference frequency, the following events re-occur. Because Q53 is off, a positive differentiated pulse from C44 appears at the emitter, and thus the collector of Q42, delivering a positive charge to C33. The negative going spike from C45 occurs when Q43 is on. This decreases current flow through CR23, and does not appear at the collector of Q32. The next differentiated negative going spike occurs when Q53 is conducting current through

CR42. The spike does not appear at the collector of Q42, but simply increases current flow through CR42. The positive going spike from C45, when Q43 is off, is conducted through CR23 and does not appear at the collector of Q32. The net result is that the voltage across C33 increases, lowering the converter LO frequency, and thus lowering the picture IF frequency.

As the limiter output shifts in frequency towards the reference frequency, the frequency of the positive or negative going spikes decreases. The negative going spikes pass through Q32 if the limiter frequency is below the reference frequency, and the positive going spikes pass through Q42 if the limiter frequency is above. This action continues until the dc voltage on C33 is such that the two signals are the same frequency. At this time, Q45 and Q46 are disabled and U13 completes the final phase-adjustment as described previously.

The circuit at the collectors of Q45 and Q46 forms an adaptive low pass filter. Its purpose is to eliminate "noise" pulses when the signal is low frequency and approaching lock. When Q45 and Q46 have a low frequency output, CR24 and CR26 connect C15 and C34 across the collectors, shorting the signal. When the output is a high frequency signal, the time constant of C15-R14 and C34-R15 maintains the charge on the capacitors, reverse biasing the diodes, and allowing the signal to pass.

When the AURAL ONLY and SPLIT switches on A44 are engaged, the Audio AFC (Automatic Frequency Control) signal, also from A44, is used to set the Converter Oscillator frequency. This places the aural signal in the frequency lock feedback loop, ensuring that the Converter Oscillator converts the aural IF carrier to the center frequency of the audio discriminator. (This mode is usually used when only the aural carrier is present.) In this mode, about +15 V is applied to pin 3 of this board. That voltage causes Q18 to saturate, shutting off U13; pulls the input of U59B high, causing CR47 to reverse bias and shut off Q45 and Q46; and provides current to pin 5 of variable transconductance amplifier U03, allowing the audio afc signal I to be amplified and drive the converter control output.

### Detector, Local Oscillator Switch Board (A54)

This board includes circuits to distribute the limiter signal and to switch between the limiter signal (for envelope detection) and the reference oscillator (for synchronous detection) as the local oscillator source to the video detector.

A unity gain isolation amplifier consisting of Q62 and Q72 provides a low impedance output for the limiter signal. This amplifier drives the Converter Phase Lock board (A53), the Audio Source switch circuit on the Phase Lock Switch board (A58), and the video LO switch circuit on this board.

When the intercarrier mode of sound detection is chosen, a negative voltage ( $-15\text{ V}$ ) appears on the cathode of CR78. This permits the limiter output to pass to the 28 MHz sound mixer through CR78. The limiter signal terminates to ground through CR59 in the split mode of sound detection, maintaining a constant load on the isolation amplifier.

The bases of Q03 and Q19 are low when envelope detection is selected, or when the phase lock loop is unlocked. This lowers the junction of R50 and R12, which turns CR41, CR61 and CR15 on. This action allows the limiter signal to pass to Q34, and terminates the reference oscillator signal through R25, C13, and CR15.

When the bases of Q03 and Q19 are high, the junction of R50 and R05 goes high turning CR14, CR22, and CR63 on and CR15, CR61 and CR41 off. The reference oscillator is now fed to the base of Q34 and the limiter output is terminated.

The reference oscillator signal is an approximate sinewave, and the limiter output signal is a square wave. Transistors Q34 and Q35 operate as an emitter coupled wave shaper. The output at the collector of Q35 is an approximate square wave signal.

## CONVERTER LO and LIMITER



### Converter Control Board (A56)

The Converter Local Oscillator circuits are similar to those found in the Reference Oscillator and Control boards described earlier and shown on diagram 8. The major difference is the frequency of operation.

The Converter-Control Oscillator circuit is a Pierce crystal oscillator, consisting of Q02 and associated components. The crystal frequency is 24.25 MHz above the visual IF. Series resonant circuit L13 and C13 connects the

feedback capacitors C15 and C05 only at the operating frequency. This ensures that Y18 operates on the correct overtone.

Mixer U22 combines the output of the converter crystal oscillator and the converter vco output from A57. The vco feeds through Q35 to pin 2 of U22.

When the circuitry operates at design center, the frequency at pin 6 of U22 is 250 kHz. The signal passes through L50 and L60 which, with associated components, form a low pass filter.

Transistors Q91 and Q92 form a Schmitt multivibrator. Feedback is accomplished through R83. The signal at the collector of Q92 is a square wave with a voltage of approximately 6 V p-p. Transistor Q95 supplies 6 V for the collectors of Q91 and Q92. During each cycle, C73 charges through CR62 and discharges through Q74. The current (charge/cycle X cycles/second) from the collector of Q74 is proportional to the difference frequency.

During stable operation, current following through Q74 will equal current flowing through Q64. Current through Q64 is controlled by Q55A, which in turn is controlled by the dc voltage at the output of the Converter Phase Lock board (A53). FET Q55B provides constant current for Q55A. Transistor Q64 acts as a voltage to current converter.

If the converter oscillator goes low in frequency, the output at pin 6 of U22 increases in frequency. This causes more current to flow through Q74, decreasing the voltage to the frequency control circuit of the converter oscillator, which in turn increases the frequency of the converter oscillator. This action continues until the frequency difference is such that the current through Q74 matches the current through Q64. Should the phase lock loop indicate that a change in vco frequency is required, the current through Q64 changes and the frequency adjusts until the currents are equal.

### Converter Oscillator Board (A57)

The voltage controlled oscillator center frequency is about 250 kHz below the crystal oscillator.

Transistor Q22 operates as a series tuned Colpitts oscillator. Tank circuit inductance is provided by L03. Positive feedback occurs via C14 and C15. Frequency control is provided by CR09. A negative going control signal at pin 3 of A57 causes the frequency to increase. Power supply variations are filtered out by Q35. The output signal from the collector of Q22 feeds to Q32,

forming a cascode stage. This stage isolates the filter, composed of L41 and C30, from the oscillator. Power gain is provided by Q62, which drives an impedance transforming bandpass filter. This filter is necessary to minimize IF feed through in the IF mixer.

### Limiter Board (A55)

This circuitry picks off the IF signal at the output of the IF Post Amp, and eliminates any amplitude modulation. The output is essentially square waves at the 24 MHz visual IF rate. Any frequency or phase modulation of the RF visual carrier will appear on this signal.

The limiter is essentially four stages of emitter coupled amplification and limiting. The four pairs of amplifiers are Q15 and Q22, Q35 and Q43, Q55 and Q63, and Q75 and Q92. Current for these transistor pairs are provided by four sets of transistors; Q02 and Q21, Q32 and Q41, Q52 and Q60, and Q81 and Q90.

The first amplifier pair is driven by Q09, operated in grounded base configuration for isolation purposes. The inductors in the emitter circuits, L15 and others, provide necessary peaking. Power supply isolation is provided by L17 and C14, and other associated components connected in a similar manner.

Both constant current transistors in each stage supply equal current to each half of the amplifying transistor pairs. Limiting action takes place as the signal current exceeds the emitter bias current. The amplifier pairs are capacitively coupled to ensure precise switching at zero crossing. The delay through this circuit is adjusted by the potentiometers connected to the bases of the constant current transistors. This delay is set so that the quadrature output is zero when the unit is operating in the envelope detection mode. Overall circuit gain is about 80 dB.

## AGC SAMPLE AND HOLD and ZERO

### CARRIER TIMING



#### Sync Stripper

The composite video is coupled through a 1.5 MHz low pass filter (luminance signal only) to the base of Q17. This emitter follower drives U24, which provides continuous negative going horizontal sync pulses at pin 7 and a negative going pulse at pin 4 during the first 3 microseconds of the back porch time. A back porch pulse from U24 cannot occur more often than 63 microseconds. Inverter U33F provides a positive going pulse, with the leading edge coincident with the beginning of the back porch, to the phase shifter and other circuitry. The pulse is also inverted by U33C and passed to U41 at pins 3 and 4.

The regenerated horizontal sync pulses also feed a pulse generator composed of Q20, R20, and C20. This timing circuit provides a 1 microsecond pulse during and for each horizontal sync tip time. This action allows sampling of equalizing pulses during the vertical interval. From the collector of Q20, these pulses feed U33A and U33B. These inverters, and also U33F, protect their associated circuitry from overvoltage if the Phase Lock boards are misconnected when used with a circuit board extender.

### Sample and Hold

A dc voltage level at either back porch or horizontal sync tip time is provided for the automatic gain control circuitry. The time of sampling is selected by front panel pushbuttons. A positive going pulse from the back porch output, or the sync tip sampling pulse, appears at pin 11 of U31D. This is the sample time for the sample and hold circuitry composed of U18, Q14, and Q12. Composite video (luminance) is present at pin 3 of U18. When the SYNC TIP button is activated, Q09 conducts. This raises the dc level of the composite video to U18 equal to the difference between back porch and sync tip. The average output level from Q12 does not shift with respect to the sampling time selected.

The positive pulse at pin 11 of U31D is ac coupled to pin 5 of U18. Integrated circuit U18 is a variable transconductance amplifier used as a sample and hold device. When pin 5 goes high, U18 turns on and the dc level corresponding to the sync tip or back porch appears across C14, the hold capacitor. When the pulse at pin 5 disappears, U18 turns off until the next pulse. When no pulse is present at pin 5 of U18 for several seconds (CW signal with no modulation applied to the demodulator input), pin 5 is so biased that U18 begins conduction, providing a dc output level relative to the average input level. FET Q14 drives Q12, which provides a dc level proportional to the signal strength to the agc circuitry. When the emitter of Q12 goes more negative, the IF attenuation increases. In early instruments Q13 increases conduction with IF overdrive, thus increasing IF attenuation.

Operational amplifier U45A provides drive for the high and low indicator lights on the front panel. The range that both lights are off is determined by R44.

### Clock

The clock pulses for the A-D Converter and readout circuitry are generated by U64A. This circuit operates as a free running oscillator. The outputs from pin 8 of U53B and pin 5 of U53A are square waves shifted by 90 degrees at one half the oscillator frequency.

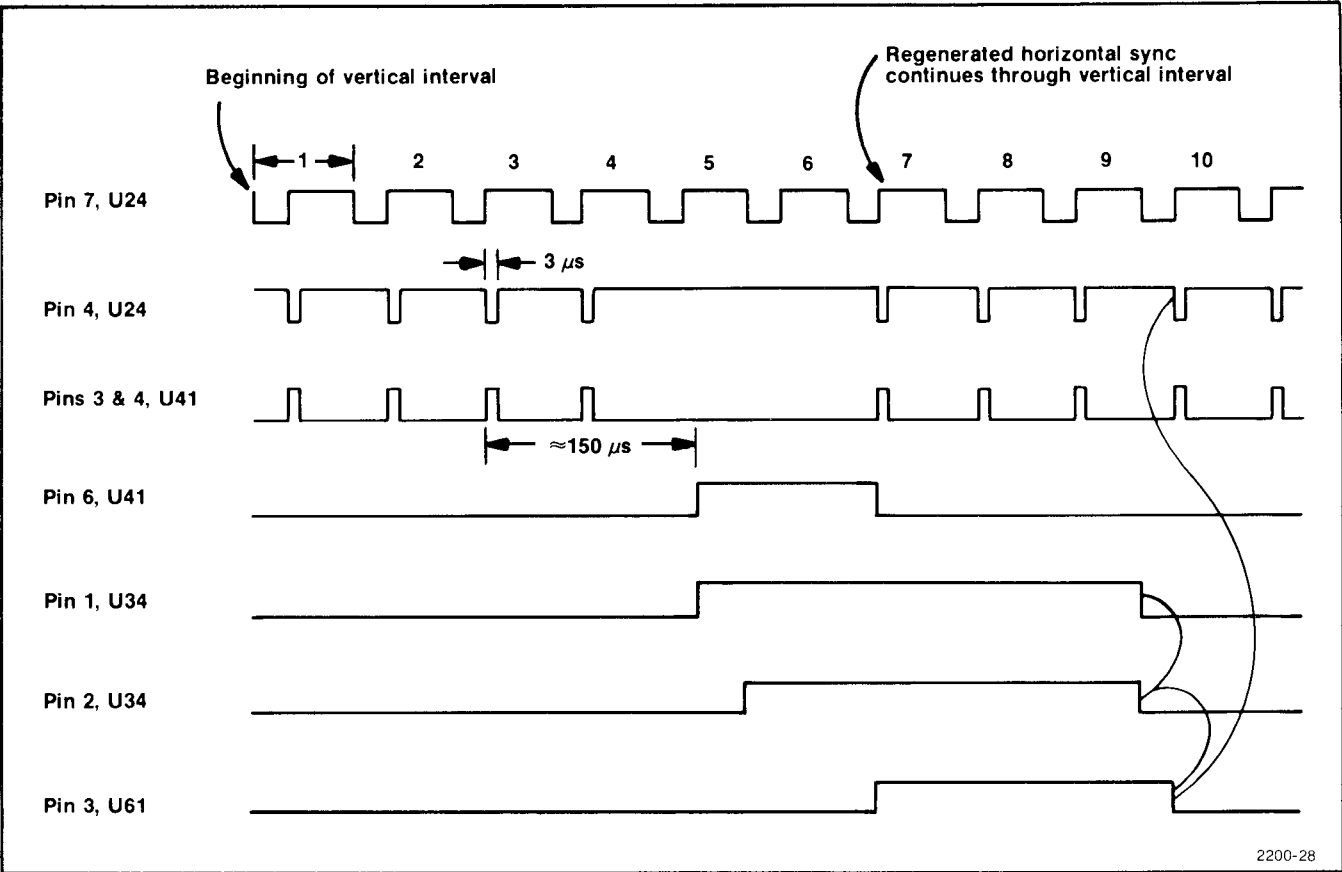


Fig. 3-11. Zero Carrier Timing Diagram.

Zero Carrier Timing

Integrated circuit U41, a retriggerable one shot multivibrator, outputs a low at pin 6 on the first back porch of a field, and stays low until approximately 150 microseconds after the last back porch pulse from U24 during the vertical blanking interval. Pin 6 remains high until the falling edge of the first back porch pulse appears. Pin 6 then goes low and remains low until the next vertical interval. Shortly after pin 6 of U41 goes high, pin 6 of U43A and pin 1 of U34 also go high.

When pin 1 of U34 went low after the previous vertical interval, the binary number three was loaded into the counter (pins 4 and 10 high and pins 3 and 11 low) and appeared at the output with pin 5 high, the B output (unused) high, and pin 2 low. See Fig. 3-11. The next regenerated horizontal sync pulse from pin 7 of U24 clocks pin 2 of U34 high. This action sets the input to shift-register U61 high. On the next back porch pulse to pin 8 of U61, pin 3 of U61 goes high. When pin 2 of U34 goes high, U34 commences counting. See Fig. 3-12 for the truth table for U34. Each count, processed as a regenerated horizontal sync pulse, appears at pin 8 of U34. On the fifth sync pulse, pin 2 of U34 goes low. This action causes the preset, pin 4, of U43A, to go low which lowers Q, pin 6, of U43A.

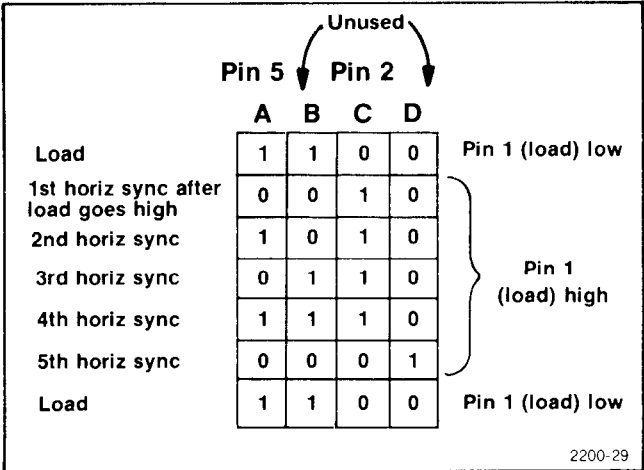


Fig. 3-12. Truth Table for U34 at A60.



This action loads U34 with a binary three as shown in the truth table, and the cycle repeats at the next vertical interval. When the data input to U61 goes low, the pulse width from the shift register is determined. At the next horizontal sync pulse, after pin 3 of U61 went high, pin 4 of U61 goes high and remains high for the same time as pin 3. This action continues for 25 lines, with U65 following the count from U61. The instrument is shipped with jumper P73 selected for the internal zero carrier pulse at horizontal line 20.

The purpose of U62B is to set the commencement of the zero carrier timing pulse into active video time. The purpose of U62A is to determine the pulse width.

The negative going output from U61 or U65 causes the  $\bar{Q}$ , pin 12, of U62B to go low and stay low for about 14 microseconds. When pin 12 of U62B again goes high, it triggers a negative-going 30 microsecond duration pulse at pin 4 of U62A. This pulse gates through U64C as the zero carrier timing pulse. An external zero carrier timing pulse can be fed from J17 on the rear panel to the base of Q51, which inverts the pulse for the input of U64C.

If the internal and external zero carrier pulses are on different lines, both will appear at the output of U64C. If the pulses are on the same line, the output pulse width will depend on the start and stop times of the two inputs.

The internal zero carrier reference pulse can be turned off from the front panel. This is done by grounding the clear pin of U62A.

### Attenuator Control

The attenuator switches provide control for the front end RF Attenuator, A1, and offset the readout to compensate for the added attenuation.

The attenuator clock signal from the Readout Driver board, A61, drives Q11. This supplies pulses of current through the ATTENUATOR switches to the latching solenoids of the Attenuator, A1. When a switch is in the current pulses latch the attenuator in. When the switch is out the attenuator leads are reversed, and the attenuator is latched out. The resistor from the +15 V supply to the collector of Q11 provides holding current to keep the solenoid latched without drawing excessive power.

Each ATTENUATOR switch also has a section that, when activated, grounds inputs to the Readout Driver circuitry on A61. This offsets the readout by the amount of attenuation.

## AGC A/D CONVERTER and PIN DRIVE

### DECODER



The agc circuit takes the sample and hold level from diagram 11 and converts it to a digital signal to control the PIN diode attenuators, and to provide readout of the input power.

### Gain Control

In the AUTO mode, integrating operational amplifier U12 averages the transitions between samples. This appears as a ramp of opposite polarity at the integrator output. The speed of this averaging is determined by the setting of the AGC SPEED control, R1, on the front panel. At the fastest speed, the agc loop bandwidth is about 320 Hz and averages about 11 lines. This averages out any sampling errors, and changes the gain fast enough for most signal variations (e.g., airplane flutter) to be corrected before they appear at the output. At the slowest speed setting, the agc bandwidth is about 7 Hz, and the integrator averages almost 800 lines. This changes the gain at a slow enough rate that low frequency effects (e.g., mains hum) will show up at the output. Diode CR16 clamps the output of U12 from going below  $-0.6$  V.

In the MANUAL mode, the agc loop is opened and the gain control circuitry is driven by R2 on the front panel (a 3-turn potentiometer labeled MANUAL GAIN). Integrated circuit U17A is connected in the feedback loop around U12, turning the circuit into a follower. Resistor R2 is connected as a variable voltage divider with the low voltage end connected to a forward biased diode, CR34, for temperature tracking. Resistor R2 sets a voltage at the negative input of U17A, which in turn causes an offset in the output of U12, thus changing the gain control signal.

Integrated circuit U17A is connected across U12 and integrating-capacitor C15. This precharges C15. In the normal case of the MANUAL GAIN control set close to the correct agc level, the capacitor is already charged close to the correct level. This eliminates any annoying change in the output signal while waiting for the agc to recharge C15 to the correct level.

For instruments with serial numbers B000119 and below, the MANUAL GAIN circuit operation is essentially the same as in later instruments. However, the MANUAL switch, S06, is located in series with the output of U17A. A slight interaction occurs between the MANUAL GAIN and AGC SPEED controls when in the MANUAL mode. Other component differences around U17A cause slower operation in the earlier instruments.

### Coarse A/D Converter

The circuitry in this block takes the analog gain control signal from integrator U12, and converts it to a parallel 7 bit binary signal used by the PIN Drive Decoder, the D-A Converter, and the readout circuits. This circuitry also supplies an analog fine agc current that drives a PIN diode in the IF Post Amp (A26) shown on diagram 3, and an analog signal and a reference level for the Readout A/D Converter, shown on diagram 13.

The circuits in this block consist of inverting operational amplifier U45B; fine agc circuit Q37; comparators U48A and U48B; counter control circuits U66A, U66B, U73B, and U64B; and up down counters U86 and U76.

Inverting operational amplifier U45B provides the fine agc signal, the analog signal for the Readout A/D Converter on diagram 13, and drives the counter control circuits in this block. Inputs are received from the Gain Control circuit through R32, and the D/A Converter circuit. Transistor Q36 provides a positive clamp at about +4.6 V, and diode CR37 provides a negative clamp at about 0 V, for out of range signals. Resistor R35 sets the output level to about +3 V when the other two input currents cancel each other.

Transistor Q37 provides the fine agc current to the IF Post Amplifier (A26) on diagram 3. Fine AGC Adjust, R47, calibrates the amount of gain control from this circuit.

Comparators U48A and U48B monitor the output of U45B, and when the output level goes under +2 V or over +4 V, a comparator switches. The resistor string R36, R49, and R37 form a voltage divider to set the upper clamp level of the output of U45B. The comparator output goes high when the positive input is higher than the negative input. The output of U48A goes low when the input signal is about +4 V. The output of U48B goes low when the input goes below +2 V.

Type D flip-flops U66A and U66B are driven by the comparator outputs, and receive a clock signal from diagram 11. If the output at pin 5 of U66A is high, counters U86 and U76 will count down; if low, they will count up. NAND gate U64B enables clock pulses from diagram 11 when the output of U45B is out of its 2 to 4 volt window. These clock pulses are used to clock binary counters U86 and U76.

A total of seven data outputs are used from the two counter ICs, U86 and U76. Terminal Q(a) of U86 is the least significant bit, and Q(c) of U76 is the most significant bit. The ripple carry (R/C) output of U86 goes low to

enable U76 when U86 overflows or underflows. The seven parallel data lines drive the D/A Converter, the PIN Drive Decoder, and the readout circuit. When the counter output reaches the binary equivalent of 0 or 95, pin 9 of PROM U94 goes high disabling the counters. This provides a total counter range of 94 steps.

Figure 3-13 shows some waveforms that may be used to help understand the operation of the A/D circuit. (It should be noted that these waveforms do not account for the effect of the PIN diode attenuators on the input signal, and therefore will not occur in the actual circuit. They are presented here only as an aid to understanding the circuit operation.) If the input signal changes by some amount, that change will be integrated by the Gain Control circuitry, and coupled to U45B as a current through R32. As the current through R32 increases, the output voltage of U45B decreases until the level reaches +2 V. At this point, comparator U48B switches to a TTL low. The low is transferred, at the appropriate time, through U66A to set the binary counters, U76 and U86, to count up. At the same time, the Q output of U66A is transferred through U73B to enable the counter clock through U64B. The next counter clock pulse causes the counters to increase their count by one. This causes the D/A Converter to add a step of current in the opposite polarity, effectively canceling the current through R32, and driving the output of U45B back to a midpoint of about +3 V.

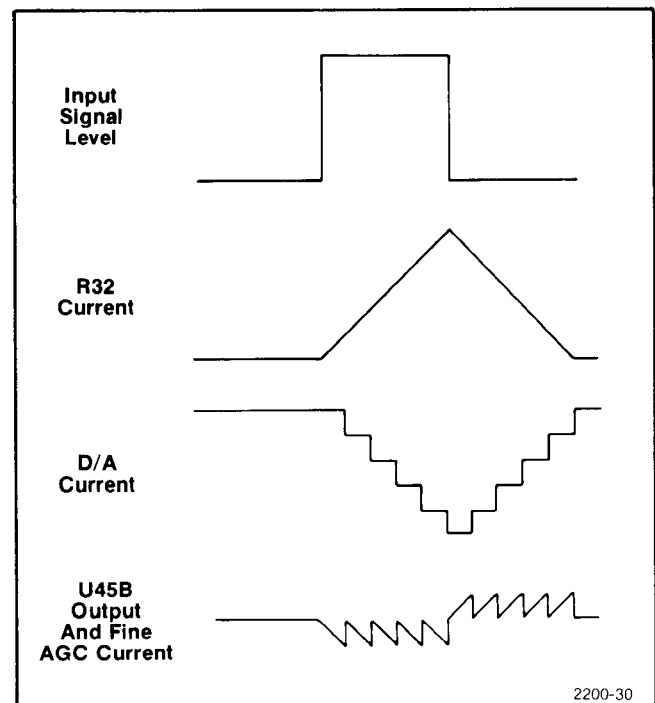


Fig. 3-13. Waveforms for Understanding the AGC A/D Converter Operation.

When the input signal decreases, the circuit works in the opposite manner. The output of U45B goes more positive, and at +4 V comparator U48A switches, causing the binary counters to count down. This decreases the current from the D/A Converter, and again returns the output of U45B to +3 V.

### D/A Converter

The D/A Converter (digital-to-analog) is driven by the binary counters in the A/D Converter block to provide steps of analog currents for offsetting the gain control current into U45B. The D/A converter consists of a set of seven inverters, driving seven diode switched, binary weighted current sources. The current sources are a set of binary weighted resistances, connected between the low impedance points of the -15 V power supply and the negative input of U45B. The resistances selected by the four most significant bits are adjustable. When an inverter output is low, the diode at that point is shut off, and current flows from the associated resistor through a series diode, and into the negative input of U45B. If an inverter output is high, the diode at the inverter is on, turning the diode to U45B off, and sinking the current from the resistors into the inverter.

### PIN Drive Decoder

The PIN Drive Decoder circuitry converts the 96 count binary signal from the A/D Converter to three 32 count binary signals for driving the three PIN Driver circuits.

The circuit consists of PROM U74 and U94, and an array of logic gates. The upper set of gates, U73A, and U71A, B, C, and D provide the output for PIN Driver A31; the middle set of gates, U91A, B, C, and D, and U93A provide the output for the PIN Driver in the Down Converter. Gate U83D selects between A30 and the Down Converter PIN Drivers.

The PROMs have a 256 X 4 bit format. The seven binary data lines from the A/D Converter feed the A<sub>6</sub> through A<sub>0</sub> input address lines of both ICs in parallel. The A<sub>7</sub> input of U94 is controlled by the counter up/down control line, and the A<sub>7</sub> input of U74 is not used.

The eight output lines of the two PROMs are used to provide several functions. Terminal O<sub>1</sub> through O<sub>4</sub> of U74, and O<sub>1</sub> of U94 provide the five data output lines, with O<sub>1</sub> of U74 the least significant bit, and O<sub>1</sub> of U94 the most significant bit. Pins O<sub>2</sub> and O<sub>3</sub> of U94 provide selection of the output gates. Pin O<sub>4</sub> of U94 disables the counters in the A/D Converter and enables U79B in the Alarm circuit when the count is maximum or minimum, indicating that the input signal is out of the agc range.

Figure 3-14 lists data useful in understanding the operation of this circuit. As the input binary signal counts from 0<sub>10</sub> to 93<sub>10</sub> the output data lines count from 0<sub>10</sub> to 31<sub>10</sub> three times, to drive the gate arrays.

When the counters are at count 0<sub>10</sub> through 31<sub>10</sub> pin O<sub>2</sub> of U94 is low, enabling the output data to pass through the upper set of output gates to PIN Driver A31. At this time, pin O<sub>3</sub> of U94 is also low, disabling the middle set of AND gates, and thus inhibiting the data from driving PIN Driver A30 and holding these outputs low. Exclusive OR U83D senses the lows on pins O<sub>2</sub> and O<sub>3</sub> of U94, and gives a low output, holding the lower set of AND gates low.

For counts of 32<sub>10</sub> through 62<sub>10</sub>, both pins O<sub>2</sub> and O<sub>3</sub> of U94 go high. This holds the outputs of the upper set of gates high (data output of 31<sub>10</sub>), enables the data through the middle set of gates, and holds the lower set of gates low.

For counts of 63<sub>10</sub> through 93<sub>10</sub>, pin O<sub>3</sub> of U94 is low. This continues holding the upper gates high, disables the middle AND gates and sets the exclusive ORs high, and enables the data through the lower set of gates.

### Alarm

In case of a loss of visual or aural carrier, the Alarm circuit gives a visual warning on the front panel and provides switched relay contacts to drive an external alarm circuit.

When the visual carrier is lost, or below the agc range, the output of U79B goes low. This energizes the VISUAL CARRIER LOSS light, DS4, and causes pin 11 of U79D to go low, energizing the AURAL CARRIER LOSS light, DS3. With pin 11 of U79D low, CR88 turns off, and C88 is discharged through R83. After about a one-half second delay, C88 is discharged enough to switch off Q89, thus de-energizing relay K97. Diode CR98 turns on when the field of the relay coil collapses, protecting Q89 from possible damage by the reverse voltage spike that would otherwise occur. The relay contacts are available at the rear panel REMOTE CONNECTOR, J14, for controlling external alarm circuits. Refer to the Installation portion of the Operating Instructions in Section 2 of this manual for further details about the external connections.

In the case where only the aural carrier is lost, the aural alarm signal from A44 goes low, causing U79D pin 11 to go low, via U79A, activating the relay alarm circuit, and the AURAL CARRIER LOSS light.

Pin Driver Addresses				Output Gate Select		Counter Enable
Count	A31	A30	Down Converter	U94 Pin 11	U94 Pin 10	U94 Pin 9
0	0	0	0	LO	LO	HI
1	1	0	0	LO	LO	LO
2	2	0	0	LO	LO	LO
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
31	31	0	0	LO	LO	LO
32	31	1	0	HI	HI	LO
33	31	2	0	HI	HI	LO
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
62	31	31	0	HI	HI	LO
63	31	31	1	HI	LO	LO
64	31	31	2	HI	LO	LO
.	.	.	.	.	.	.
.	.	.	.	.	.	.
.	.	.	.	.	.	.
93	31	31	31	HI	LO	HI

2200-31

Fig. 3-14. PIN Driver Decoder Data.

### +10 V Supply

Voltage divider R19 and R06 provides +10 volts to the positive input of voltage follower U17B. The follower supplies +10 volts to the comparator divider in the A/D Converter, and the MANUAL GAIN control, R2. The voltage is also supplied to the sync tip offset circuit shown in the Sample and Hold block on Diagram 11.

## READOUT DRIVER



This circuitry converts the digital and analog agc signal to a signal capable of driving the front panel display.

### Clock

A clock signal at about two Hertz is generated by U91. This signal feeds to the base of Q11 shown on the Zero Carrier Timing schematic 11. The signal at the collector of Q11 is switched to the A1 attenuator latching relays. Switch S03 changes the direction of the current through the latching relay coils, thus changing the attenuation as selected. When pin 3 of U91 goes low, U63B is preset through CR91. This action causes a low on pin 8 of U63B. This low remains until the readout clock pulse goes high. On the rising edge of the clock input, pin 11 of U63B, the output (pin 8) goes high. This action causes pin 13 of

U60D to go high. Pin 8 of U60C goes low at this time, but pin 12 of U60D remains high for a short time while C72 discharges through R62. The low then creates a short, negative going pulse at pin 11 of U60D, with a falling edge coincident with the positive going edge of the readout clock. This low at pin 11 of U60D feeds to U60B which resets U81, loads the data bits present on the agc data bus into binary counters U88 and U98 and the preset inputs to decimal counters U43, U46 and U48.

### Binary Counters

Pin 5 of U60B goes low about every one-half second. Pin 6 of U60B goes high at the same time. This action starts U81 counting. The clock to pin 14 triggers the counting on the negative edge. See Fig. 3-15 for the timing diagram for U81. When the binary data (maximum 95 counts) are loaded into U88 and U98, one or both of the maximum-minimum terminals will be low. Also, at least one of the maximum-minimum outputs for the decimal counters U43, U46 and U48 is low. These lows at pins 12 or 13 of U68D cause a low at pin 11 of U68D, which enables decimal counter U48 and binary counter U98. On the next clock pulse, at pins 1, 2 and 13 of U65A and at pins 14 of the decimal counters, the counters start the count. As shown in the timing diagram, U81 outputs one pulse to pins 14 of U98 and U88, for each seven readout clock pulses. This accounts for the 0.7 dB change in attenuation for each binary data unit in the agc circuit.

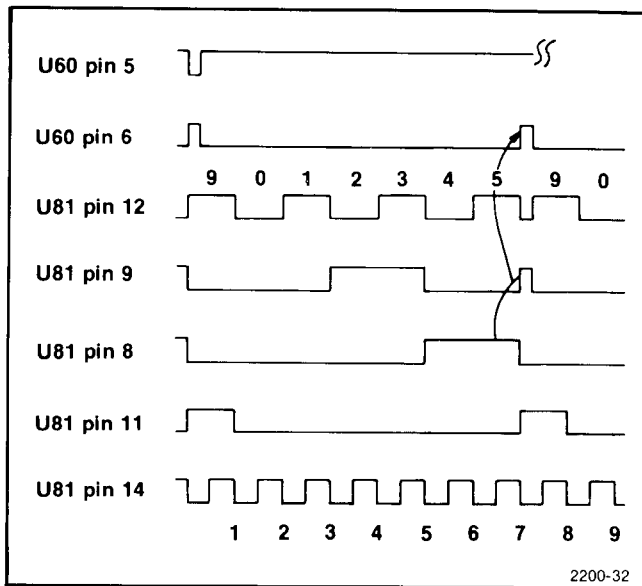


Fig. 3-15. Timing Diagram for Divide by Seven Counter, U81 on A61.

### Fine A/D Converter

The reference voltage for the fine agc range between the 0.7 dB steps is applied to the base of Q96A. The voltage at the emitter of Q96A and pin 2 of U94 is about +3.6 V. The voltage at the emitter of Q96B varies between about +1.6 V and +3.6 V, depending on the amount of attenuation (0 dB to 1.4 dB) required. The voltage at the emitter of Q96B determines the number of clock pulses, charging and discharging C93 and C94, necessary to charge C92 to a sufficient voltage so that pin 3 of U94 reaches the same level as pin 2. The capacitance of C94 is adjusted so that when the voltage at the emitter of Q96B is at the lowest value, exactly 14 clock pulses are required to raise the voltage at pin 3 of U94 to equal the voltage at pin 2. After the binary counters stop, the decimal counters continue counting until pin 7 of U94 goes low.

Pins 6 and 9 of U85 are high as previously described. This action causes a high on pin 1 of U68A, with pin 11 of U68D high. On the next negative going clock pulse, pin 2 of U68A goes low, causing pin 3 of U68A to go low. With pin 6 of U68B high, Q73 conducts and Q92 is off. At the same time, Q83 conducts, bringing the collector near ground. Charge accumulated on C94 and C93 discharges through CR96 to +5 V. When pin 2 of U68A goes low at the next negative-going clock transition, Q83 stops conduction and C93 and C94 charge toward +15 V. All current charging C93 and C94 must be absorbed by C92 through Q95. When the voltage across C92 matches the voltage on pin 2 of U94, pin 7 of U94 goes low, pins 4 and 8 of U85 go high, and pins 6 and 9 low. This action places a high on the enable terminals of the decimal counters, causing them to stop counting.

### Offset

The inputs of U43, U46, and U48 are preset depending on the starting count desired. The start count is determined by the settings of S57 and S59. This count is factory set at 39.5. See Fig. 3-16. The fixed attenuation pushbuttons on the front panel add up to an additional 300 counts, depending on the attenuation selected. When both pushbuttons are pressed, pins 11 and 7 of U41 are raised to +5 V. If 10 dB of fixed attenuation is added, only pin 11 is raised. If 20 dB is added, pin 7 is raised to +5 V. This digital information is added to the preset from S57 and S59. Switches S57 and S59 may be reset to other starting counts within the range of the readout, which is a total of 67.9 dB. For example, if 20 dB of additional gain is added to the input of the 1450-1, to read the actual signal strength, set the counter start to 59.5 (39.5 + 20). The readout will now read from approximately -89.5 to -21.6 with the front-panel attenuator pushbuttons released, or -59.5 to +8.4 with the attenuator pushbuttons pressed.

### Decimal Counters

As the decimal counters start at the most negative reading, progress to 0 dB and then count up for a positive dB reading, the decimal counters must switch from count-down to count-up. When the three decimal counters reach 0, pins 3, 4, and 5 of U65B all go high. This action lowers the clear pin at U63A, causing pin 5 to go low. This action lowers the cathode of the vertical bar in the plus sign of DS24 on the Readout Board (A62) and changes the decimal counters to the count up mode. The counting continues until the count in the binary counters reaches zero. At this time, pins 12 of U88 and U98 both go high, placing a high on pin 9 of U68C and pin 5 of U68B. The decimal counters continue to count as pin 10 of U68C is still low.

### LED Drivers

The accumulated count in the decimal counters is processed through binary coded decimal to seven segment decoders, U32 for the tens digit, U35 for the ones digit, and U38 for the tenths digit. A high is also placed on the input of U65C, which causes Q50 to conduct. This action applies anode voltage to the polarity sign and the three digit display modules displaying the accumulated count. After the count is displayed, the cycle repeats.

## POWER SUPPLY



The +15 V and +5 V supplies are referenced to the -15 V supply, which is referenced to zener diode VR62. All supplies have the series pass transistors configured as collector outputs. This allows the regulated outputs to operate closer (approximately 1 V drop) to the unregulated busses.

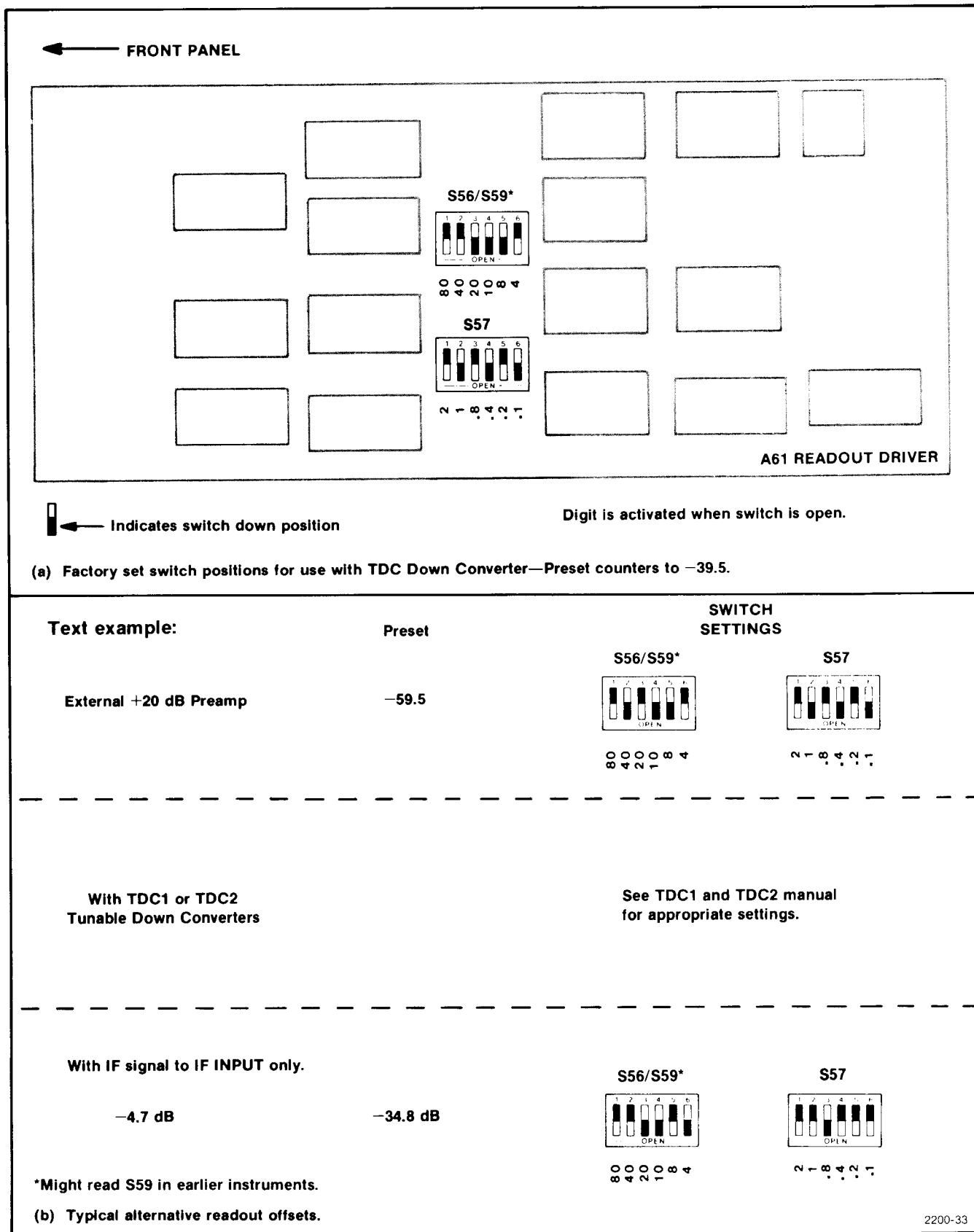


Fig. 3-16. Readout Offsets.

### −15 V Supply

In the −15 V supply, the voltage at the base of Q73 holds at −6.2 V. Should the −15 V supply go more negative, Q72 conducts more current. This causes Q82 to increase conduction, reducing conduction in Q83 and Q95. This action reduces current flow to the −15 V bus, causing the supply to return to the preset level. The regulating circuitry for all three supplies is fast enough to respond to the 120 cycle ripple present from the rectifiers. Should the current from the supply passing through R91 exceed about 2 A, Q81 comes into conduction. This action causes Q82 to conduct, which reduces conduction in Q83, holding the current through Q95 to a safe value. The output impedance of Q72 and Q73 is matched to reduce unequal feedback from collectors to bases, resulting in increased ripple rejection. Loop compensation to prevent oscillation is provided by C84, C85 and R86. Constant voltage across R94, to reduce hum, is provided by VR73. The LED mounted on the power supply circuit board indicates when voltage is present on the −15 V bus.

### +5 V Supply

The +5 V supply operates in a manner similar to the −15 V supply. Reference is obtained at the junction of R51 and R60. Should the +5 V increase in voltage, Q52B

increases conduction, causing Q53 to increase conduction. Constant current is provided by Q54. This action reduces conduction in Q43, which in turn reduces conduction in Q34. If the current passing through R41 exceeds about 2 A, Q41 comes into conduction. This action reduces current flow through Q34 to a safe level. Turn on current for Q43 is provided by current source Q54, which also aids in ripple reduction. Loop compensation to prevent oscillations is provided by R44, C44 and C54. The 5 V winding on T10 is fused. This is necessary, as a shorted 5 V winding causes insufficient current in the primary winding to open the primary fuse.

### +15 V Supply

Reference for the +15 V supply is obtained through divider R20 and R21 connected to the −15 V supply. If the +15 V supply increases in voltage due to decreasing load, Q22B increases conduction. This action increases conduction in Q14 and reduces conduction in Q13 and Q05. The reduced current supplied to the decreased load lowers the voltage to the predetermined level. If more than about 2 A of current flows through R02, Q10 comes into conduction, limiting the current to a safe value. Loop compensation to stop oscillations is provided by C13, C14 and R15. Start up current for Q13 is provided by Q23 which, as a collector current source for Q14, also reduces ripple.





# CALIBRATION

## INTRODUCTION

The procedures in this section serve as guides to perform the calibration steps necessary to ensure the proper operation of the 1450-1 TELEVISION DEMODULATOR. Limits, tolerances, and waveforms appearing in this section are not instrument specifications, except as listed in Section 1, Introduction and Specification.

The 1450-1 front- and rear-panel names are capitalized; e.g., RF IN. Control and connector names on internal controls in the 1450-1 have only the first letter capitalized; e.g., Gain. Test equipment connector and control names are not capitalized.

The capabilities of the test equipment listed are the minimum required to calibrate the 1450-1. If alternative equipment is used, it must meet or exceed the specifications of the listed equipment. Refer to Table 4-1 for test equipment needed to calibrate the 1450-1.

The 1450-1 power must be on for at least 1 hour before any measurements and/or adjustments are made.

The following calibration is in an orderly manner and will result in a calibrated instrument within the specifications. Note that if an adjustable component is replaced in an LC filter, the filter may be severely misadjusted by the component replaced. In such a case, it is recommended that the adjustment step associated with the circuit board be performed, then perform the overall calibration.

The Calibration section is divided into two main parts: Performance Check and Adjustment Procedure. The Adjustment Procedure is preceded by a short-form procedure.

The table of contents at the front of this manual lists the page numbers of all the performance checks and adjustment steps.

**Table 4-1  
RECOMMENDED TEST EQUIPMENT**

Description	Minimum Specification	Where Used	Equipment Used
Down Converter	Down Converter Vision IF must be the same as the 1450-1 IF Option.	Performance Check and Calibration	Tektronix TDC Down Converter
Test Modulator	0.1 dB Flatness within IF Bandpass Limits	Performance Check and Calibration	Tektronix Part No. 067-0886-01/02/03
Oscilloscope Mainframe	At least 50 MHz Bandwidth.	Performance Check and Calibration	Tektronix 7704
Differential Amplifier	At least 1 mV/div Sensitivity, dc offset and variable low frequency bandwidth.	Performance Check and Calibration	Tektronix 7A22
Differential Comparator	At least 20 MHz Bandpass.	Return Loss	Tektronix 7A13
Dual-Trace Amplifier	At least 50 MHz Bandpass.	Performance Check and Calibration	Tektronix 7A18
Time Base	100 ns/div to 5 ms/div Calibrated Time Base.	Performance Check and Calibration	Tektronix 7B53A
Spectrum Analyzer	3 kHz to 3 MHz Resolution for frequencies to 60 MHz.	Performance Check and Calibration	Tektronix 7L14
Tracking Generator	Compatible with the Spectrum Analyzer.	Performance Check and Calibration	Tektronix TR502
Power Supply Module	Capable of driving several loads.	Performance Check and Calibration	Tektronix TM503
Multimeter	0.1% accuracy.	Performance Check and Calibration	Tektronix DM502
Frequency Counter	Compatible with Tracking Generator.	Performance Check and Calibration	Tektronix DC508
Low-Pass Filter	250 kHz, 75 $\Omega$ , low insertion loss.	Calibration	Tektronix Part No. 015-0352-00
Audio Oscillator	30 Hz to 20 kHz Distortion less than 0.035%.	Performance Check and Calibration	Tektronix SG505
Level Sine Wave Generator	250 kHz to 50 MHz Output Frequency Range.	Performance Check and Calibration	Tektronix SG503
Function Generator	1 Hz to 100 Hz with DC Offset.	Performance Check and Calibration	Tektronix FG503
50 $\Omega$ Step Attenuator	70 dB in 10-dB steps and 9 dB in Unit steps.	Performance Check and Calibration	HP355C and HP355D

**Table 4-1 (Cont.)  
RECOMMENDED TEST EQUIPMENT**

Description	Minimum Specification	Where Used	Equipment Used
Video Amplitude Calibrator	Square wave output 0.2% accuracy to 1150 mV.	Performance Check and Calibration	Tektronix Part No. 067-0916-00
Peak-to-Peak Detector	Flat within 0.03 dB from 50 kHz to 6 MHz.	Performance Check and Calibration	Tektronix Part No. 015-0408-00
RF Signal Generator	4.5 MHz to 60 MHz; outputs from -30 dBm to 0 dBm; AM and FM capabilities.	Performance Check and Calibration	HP 8640B
75 $\Omega$ Precision Termination	75 $\Omega$ $\pm$ 0.10%.	Performance Check and Calibration	Tektronix Part No. 011-0103-00
Audio Spectrum Analyzer with Tracking Generator	10 Hz to 3 kHz Resolution; 600 $\Omega$ Input; 5 kHz to 20 kHz Frequency Spans.	Performance Check and Adjustment	Tektronix 7L5 Opt.25
Full Field Signal Source	Linearity, 2T Pulse & Bar, and Field Sweep.	Performance Check and Adjustment	Tektronix 1410 with TSG3, TSG5, and TSG6
Power Meter	-35 dBm to 0 dBm.	Performance Check and Adjustment	HP 435A
Waveform Monitor	Display Field Rate and Line Rate Waveforms; Line Selection; External horizontal input.	Performance Check and Adjustment	Tektronix 1480
Vectorscope	Capable of 1° diff phase and 1% diff gain measurements.	Performance Check	Tektronix 520A
600 $\Omega$ Matching Switch	N/A	Performance Check and Adjustment	See Fig. 4-1.
8 $\Omega$ to 600 $\Omega$ coupler with Switchable 300 dB Attenuator	N/A	Performance Check and Adjustment	See Fig. 4-2.
High-Frequency Return Loss Bridge	4.5 MHz to 1 GHz; 40 dB directivity; 50 $\Omega$ input.	Performance Check and Calibration	Wiltron VSWR Bridge 62N50 (2)
Low-Frequency Return Loss Bridge	54 dB dc to 10 MHz; 54 dB directivity; 75 $\Omega$ input.	Return Loss Check	Tektronix Part No. 015-0149-00
RMS Voltmeter	0.01% accuracy; 15 kHz filter, 6 MHz bandwidth.	Performance Check	Fluke 8922A True RMS meter

**Table 4-1 (Cont.)  
RECOMMENDED TEST EQUIPMENT**

Description	Minimum Specification	Where Used	Equipment Used
SMA Male-to-BNC Female	N/A	Performance Check	Tektronix Part No. 015-1018-00
BNC Male-to Pin Jack Adapter Cable	N/A	IF Filter Flatness Adjustment	Tektronix Part No. 175-1178-00
130-kHz Low Pass Filter	N/A	Signal-to-Noise Check	See Fig. 4-3
Test Jumper	N/A	Calibration	See Fig. 4-4
R1000 Test Fixture	N/A	Calibration	See Fig. 4-5
Video Low Pass Filter	N/A	Calibration	See Fig. 4-6

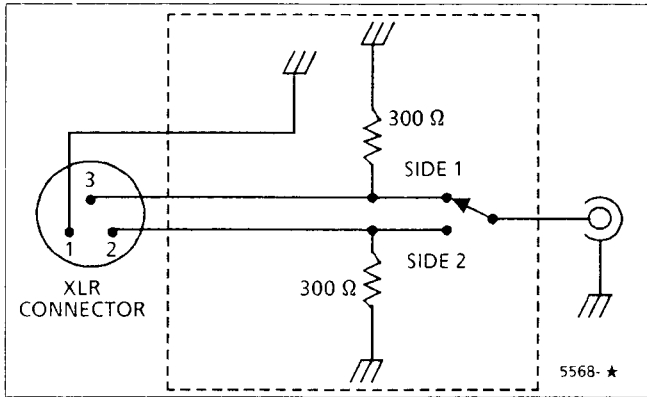


Fig. 4-1. 600Ω matching switch.

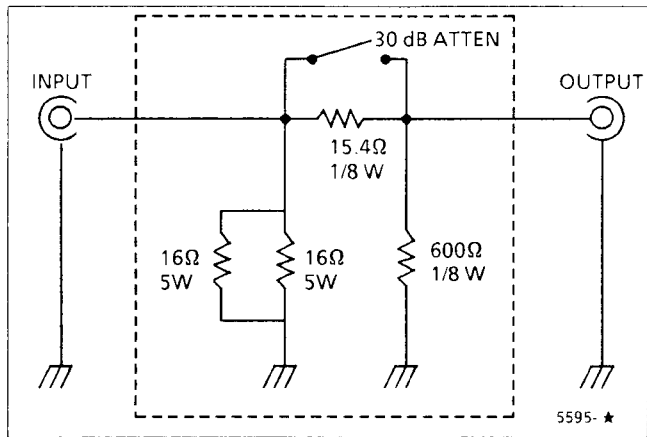


Fig. 4-2. 8Ω to 600Ω matching coupler.

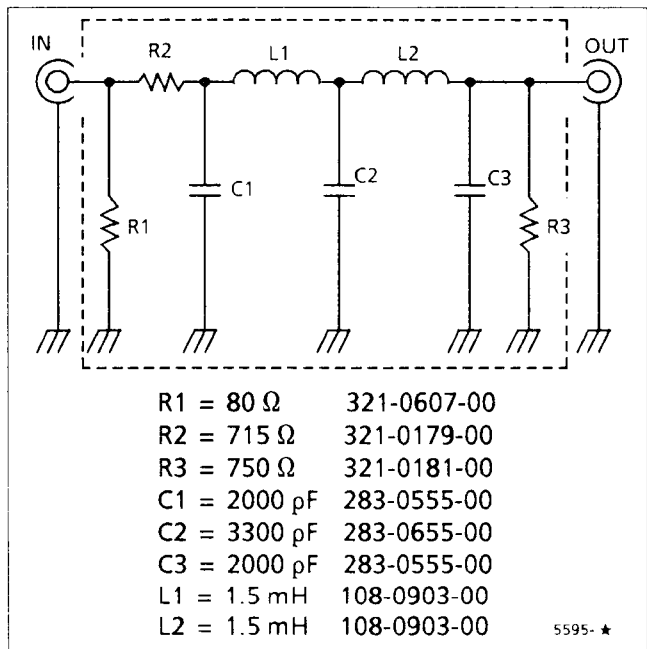


Fig. 4-3. 130 kHz noise filter (for signal-to-noise ratio measurements).

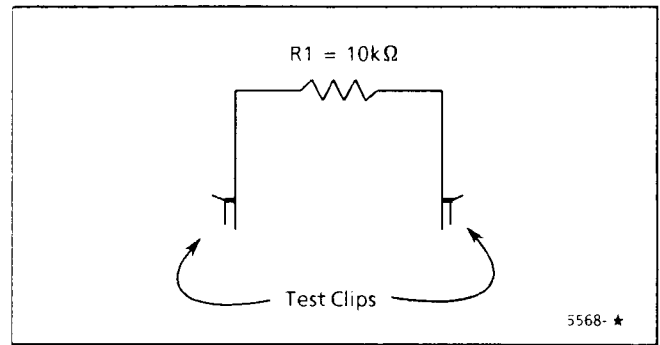


Fig. 4-4. Test jumper.

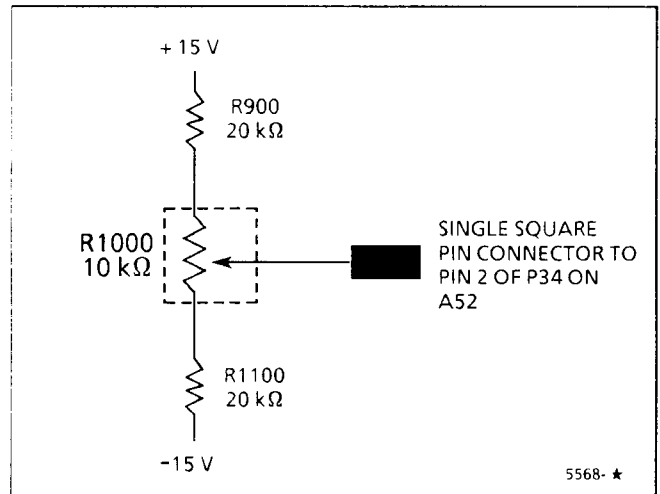


Fig. 4-5. R1000 test fixture.

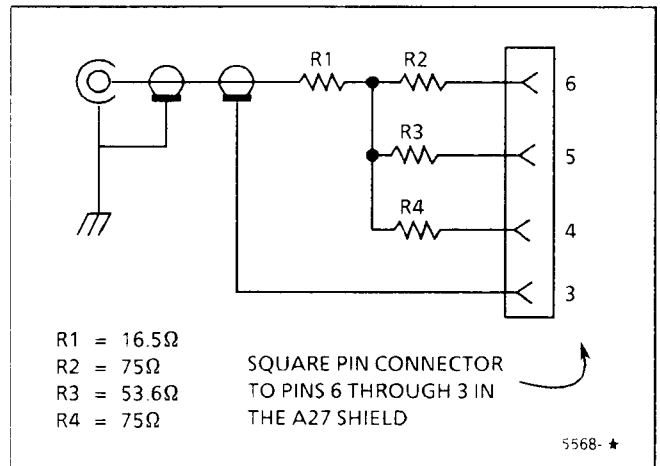


Fig. 4-6. Video low pass filter.

# PERFORMANCE CHECK PROCEDURE

## 1. Check Power Supply Ripple

- Ensure the line voltage range is properly set and the proper line fuse is installed. Refer to Fig. 2-11 in this manual for details.
- Monitor the +15 V supply at pin 2 of P80 on A70 Power Supply board with a probe from the differential amplifier. Set the high frequency -3 dB point filter on the differential amplifier to .3 kHz.
- CHECK** that ac ripple on the +15 V supply is 1 mV p-p or less over the line voltage range given in Table 4-2.

**Table 4-2**  
**LINE VOLTAGE RANGES**

Line Selection		Range
115 V	LOW	90 V - 110 V
	HIGH	108 V - 132 V
230 V	LOW	198 V - 242 V
	HIGH	216 V - 250 V

## 2. Check Adjacent Channel Cross-Modulation

- Connect and set the test equipment as shown in Fig. 4-7.
- Set the power levels of the rf signal generator (F1), the leveled sine wave generator (F2), and the Test Modulator (F3) to the levels given in Table 4-3 at the UPPER frequencies. Monitor the power levels with the power meter. To set the power level of each input, F1 for example, first disconnect the other two inputs, F2 and F3, from their VSWR bridges, A and B.
- Connect the output of VSWR bridge B to the 1450-1 IF INPUT.
- CHECK** that the cross-modulation signal at 1 MHz is -54 dBm or less.

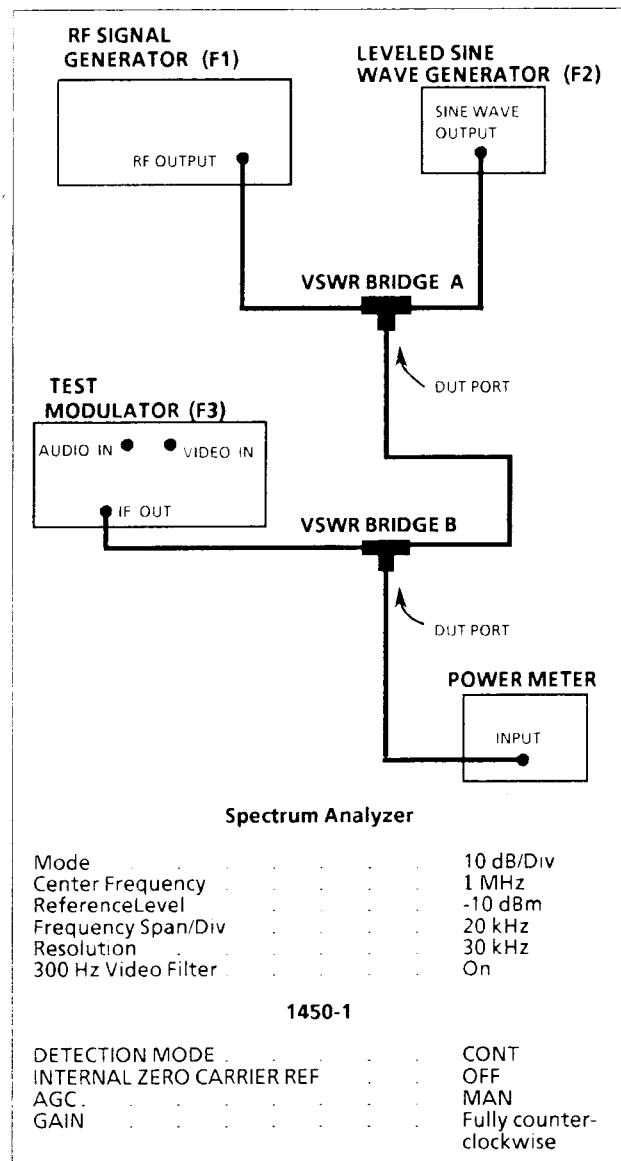


Fig. 4-7. Setup to check adjacent channel cross-modulation.

- Connect the output of VSWR bridge B to the power meter.
- Set the power levels of the rf signal generator (F1), the leveled sine wave generator (F2), and the Test Modulator (F3) to the levels given in Table 4-3 at the LOWER frequencies.

Table 4-3  
ADJACENT CHANNEL FREQUENCIES

CHANNEL CARRIER (F3)	ADJACENT CARRIER (F1)	ADJACENT SIDEBAND (F2)
45.75 MHz (OPT. 3)	51.75 MHz (UPPER) 39.75 MHz (LOWER)	50.8 MHz (UPPER) 38.8 MHz (LOWER)
38.9 MHz (OPT. 2)	44.9 MHz (UPPER) 32.9 MHz (LOWER)	43.9 MHz (UPPER) 31.9 MHz (LOWER)
37.0 MHz (OPT. 1)	43.0 MHz (UPPER) 31.0 MHz (LOWER)	42.0 MHz (UPPER) 30.0 MHz (LOWER)
POWER LEVEL -28 dBm	-28 dBm	-34 dBm

- g. Connect the output of VSWR bridge B to the 1450-1 IF INPUT.
- h. **CHECK** that the cross-modulation pulse at 1 MHz is -54 dBm or less.

### 3. Check System AGC Range and IF Input Level Range

- a. Connect the rf signal generator rf output through the 10 dB/step and 1 dB/step attenuators to the power meter. Set the step attenuators for a total of 3 dB attenuation. Set the rf signal generator frequency to the visual carrier frequency of the TDC being used. See Table 4-2 in the TDC manual for this frequency. Set the output level of the rf signal generator for a reading of -3 dBm at the power meter.
- b. Connect the output of the step attenuators to the 1450-1 RF Input. Install the appropriate TDC in the 1450-1 and make the appropriate front panel connections. Set the 1450-1 AUTO AGC to SYNC TIP and AURAL ONLY to OFF.

- c. **CHECK** that the VISUAL CARRIER LOSS LED is off.
- d. **CHECK** that as the combined attenuation of the step attenuators is varied from 3 dB to 69 dB in 1-dB steps, the 1450-1 RF SIGNAL INPUT LEVEL readout tracks the setting of the step attenuators  $\pm 2$  dBm.
- e. Continue to increase the attenuation until the RF SIGNAL INPUT LEVEL readout stops increasing.
- f. **CHECK** that the VISUAL CARRIER LOSS LED is on.
- g. Set the step attenuators to 25 dB.
- h. **CHECK** that the 1450-1 RF SIGNAL INPUT LEVEL readout remains within 0.2 dBm when switching SOUND TRAP between IN and OUT.
- i. Remove the TDC from the 1450-1.

### 4. Check Visual IF Range

- a. Set the rf signal generator output level to -20 dBm at the 1450-1 IF frequency and connect its rf output to the 1450-1 IF INPUT.
- b. Set the 1450-1 DETECTION MODE to CONT, AURAL ONLY to OFF, and AUTO AGC to SYNC TIP.

#### NOTE

*The 1450-1 UNLOCKED LED will light briefly as the rf signal generator frequency is changing.*

- c. **CHECK** that when the rf signal generator frequency is varied  $\pm 120$  kHz from the 1450-1 IF frequency, the UNLOCKED LED remains off. Ensure the UNLOCKED LED lights at some frequency beyond IF  $\pm 120$  kHz.

### 5. Check AGC Speed

- a. Connect and set the test equipment as shown in Fig. 4-8.

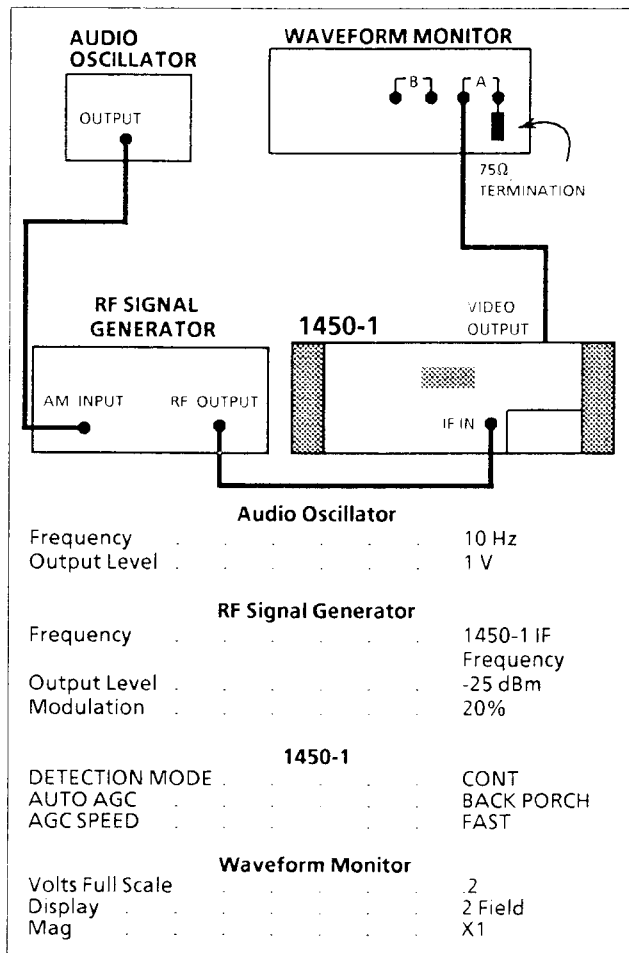


Fig. 4-8. Setup for checking AGC speed.

- b. **CHECK** that the 10 Hz signal is not displayed on the waveform monitor.
- c. Set the 1450-1 AGC SPEED to SLOW.
- d. **CHECK** that the 10 Hz signal is displayed on the waveform monitor.

## 6. Check Synchronous Time Constant

- a. Connect and set the test equipment as shown in Fig. 4-9.
- b. Set the rf signal generator frequency to the channel L.O. frequency:

L.O. frequency = channel visual carrier + visual IF.

- c. Set the audio oscillator output level so the waveform monitor display matches the display in Fig. 4-10a.

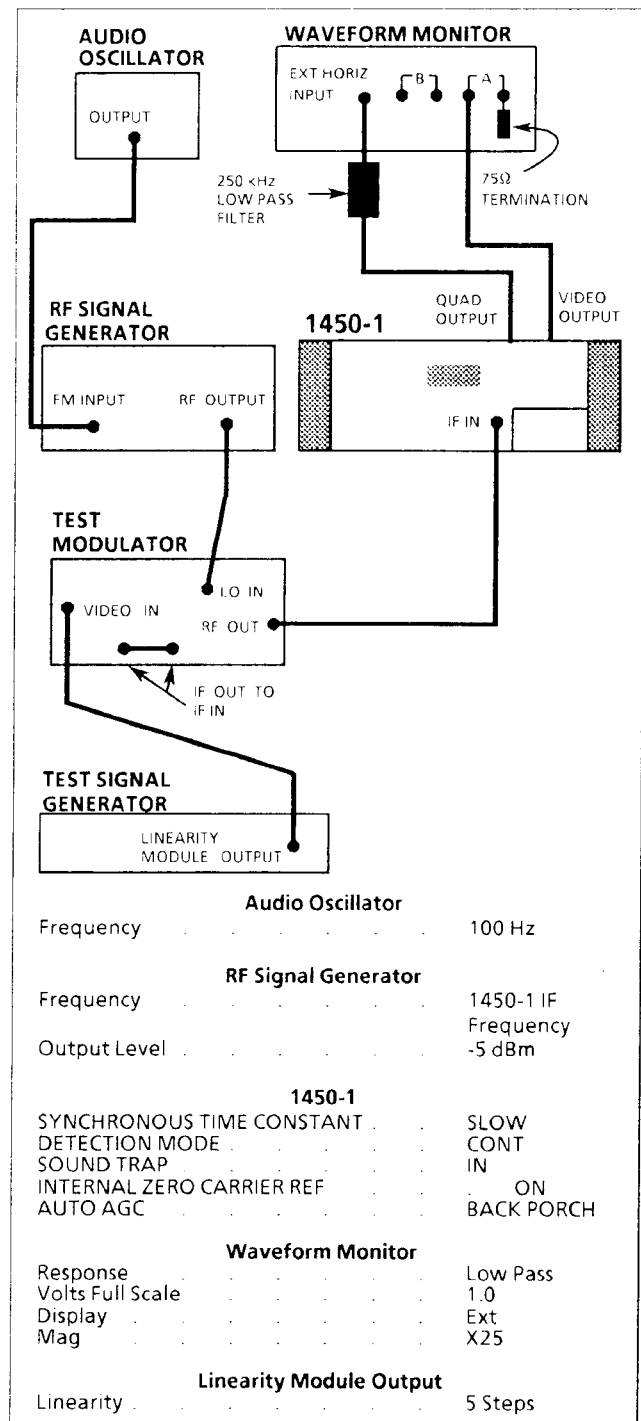
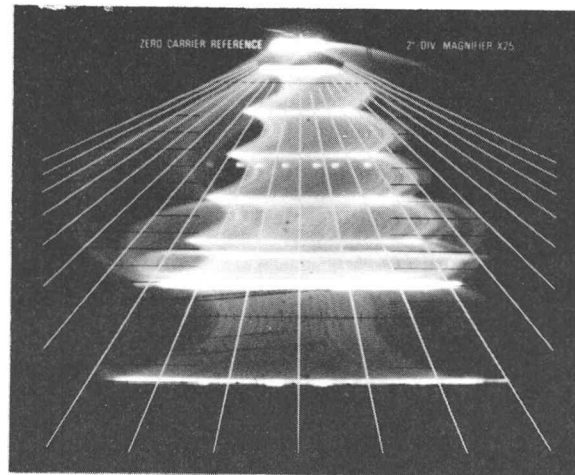


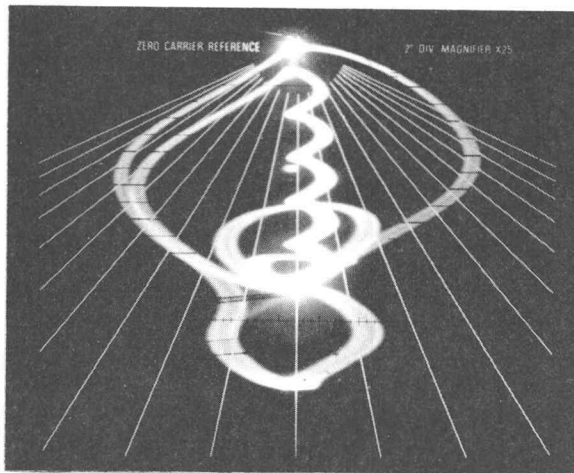
Fig. 4-9. Setup for checking synchronous time constant.

- d. **CHECK** that while switching the SYNCHRONOUS TIME CONSTANT between SLOW, NORM, and FAST, and the DETECTION MODE between CONT, SYNC TIP, and BACK PORCH, the waveform monitor displays match the appropriate display in Fig. 4-10.

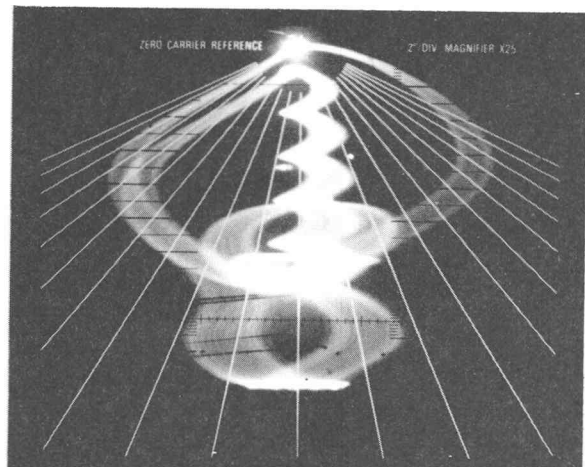




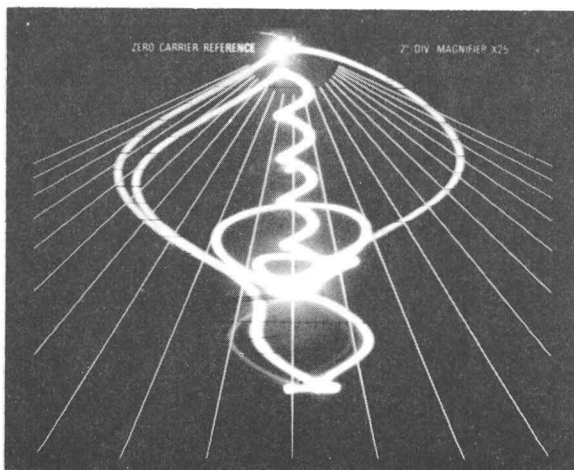
a. All detection modes (SLOW mode)



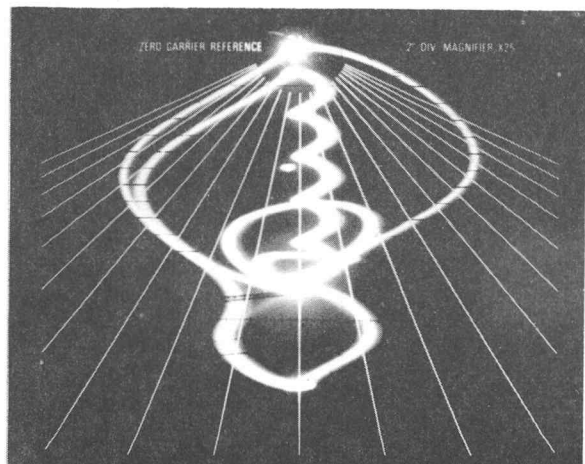
b. CONTINUOUS DETECTION (NORMAL mode)



c. SYNC TIP and BACK PORCH DETECTION (NORMAL mode)



d. CONTINUOUS DETECTION (FAST mode)



e. SYNC TIP and BACK PORCH DETECTION (FAST mode)

5568-151

Fig. 4-10. Correct waveforms when checking Synchronous Time Constant.

## 7. Check Video Output Levels

- a. Connect and set the test equipment as shown in Fig. 4-11.

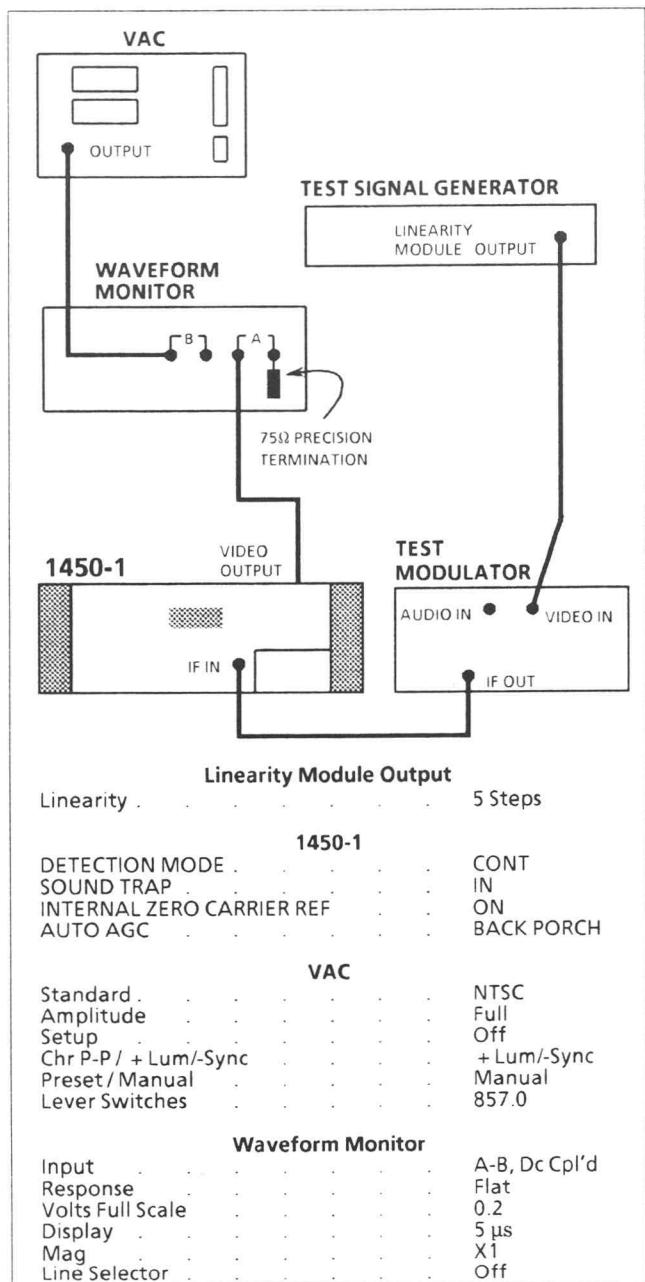


Fig. 4-11. Setup for checking video levels.

- b. Use the waveform monitor position controls to display the blanking level, and identify the zero carrier pulse by switching the 1450-1 INTERNAL ZERO CARRIER REF between OFF and ON.

- c. **CHECK** that the blanking level is 857 mV  $\pm$  17 mV from the zero carrier pulse.
- d. Set the 1450-1 AUTO AGC to SYNC TIP and set the vac amplitude to B43.0.

### NOTE

To set the vac amplitude readout to B43.0, select *pal*, *preset*, and *CB Q*. This will give a readout of FFF.F. Then use the variable control to decrease the output to B43.0. B43.0 corresponds to 1143.0 mV.

- e. **CHECK** that the zero carrier pulse is 1143.0 mV  $\pm$  22 mV from the sync tip.
- f. **CHECK** that sync tip is 286 mV  $\pm$  5.7 mV from blanking by subtracting the zero carrier pulse-to-blanking level from the zero carrier pulse-to-sync tip level.
- g. Connect the 1450-1 VIDEO OUTPUT through a 75Ω termination to the test oscilloscope, with the vertical amplifier dc coupled and set to 20 mV/div.
- h. **CHECK** that the blanking level is at 0 Vdc  $\pm$  50 mV.

## 8. Check 2T Bar Overshoot

- a. Connect and set the test equipment as shown in Fig. 4-12.
- b. Install graticule A on the waveform monitor and use the 1450-1 MANUAL GAIN control to set the 2T bar amplitude to exactly 100 IRE.
- c. Set the waveform monitor volts full scale to 0.2, and position the top of the 2T bar on the 100 IRE graticule line. The graticule is now calibrated to 2%/major division.
- d. **CHECK** that overshoot on the leading edge of the 2T bar is 1% ( $\frac{1}{2}$  major division) or less in all detection modes, with SOUND TRAP set to IN and OUT.

## 9. Check Line Time Distortion

- a. Connect and set the test equipment as shown in Fig. 4-12.

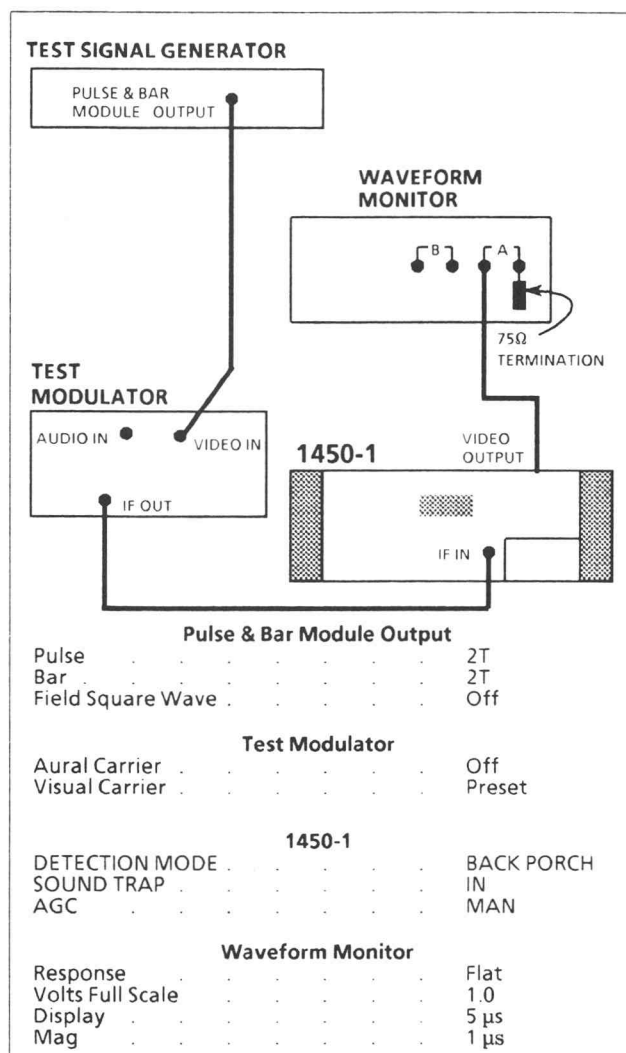


Fig. 4-12. Setup for checking 2T bar overshoot.

**NOTE**

*Omit parts b and c of this step if continuing from step 8.*

- b. Install graticule A on the waveform monitor and use the 1450-1 MANUAL GAIN control to set the 2T bar amplitude to exactly 100 IRE.
- c. Set the waveform monitor volts full scale to 0.2, and position the top of the 2T bar on the 100 IRE graticule line. The graticule is now calibrated to 2%/major division.
- d. **CHECK** that tilt on the 2T bar (excluding the first and last  $\mu$ s of the bar) is 0.5% ( $\frac{1}{4}$  major division) or less, in all

SYNCHRONOUS DETECTION modes, with SOUND TRAP set to OUT.

- e. **CHECK** that tilt on the 2T bar (excluding the first and last  $\mu$ s of the bar) is 1% ( $\frac{1}{2}$  major division) or less, in all DETECTION modes with SOUND TRAP set to IN and OUT.

**10. Check "K" Factor (Kpb) Pulse-to-Bar Ratio**

- a. Connect and set the test equipment as shown in Fig. 4-12.

**NOTE**

*Omit parts b and c of this step if continuing from step 9.*

- b. Install graticule A on the waveform monitor and use the 1450-1 MANUAL GAIN control to set the 2T bar amplitude to exactly 100 IRE.
- c. Set the waveform monitor volts full scale to 0.2, and position the center of the top of the 2T bar on the 100 IRE graticule line. The Kpb scale is now calibrated to 0.2%/division.
- d. **CHECK** that the 2T pulse is within 0.5% (2.5 divisions) of the 100 IRE graticule line as measured on the Kpb scale in all SYNCHRONOUS DETECTION modes with SOUND TRAP set to OUT.

**11. Check Field Time Distortion**

- a. Connect and set the test equipment as shown in Fig. 4-12 with the following exceptions:
  - (1) set the linearity module output field square wave to on.
  - (2) set the waveform monitor display to 2 field.
- b. Set the 1450-1 GAIN control so the field square wave back porch level is at 0 IRE and peak white is at 100 IRE.
- c. Set the waveform monitor volts full scale to 0.2 and position the top of the field

square wave on the 100 IRE graticule. The major divisions are now calibrated to 2%.

- d. **CHECK** that tilt on the top of the field square wave is 0.5% or less in all DETECTION modes with SOUND TRAP set to IN and OUT.
- e. Set the pulse and bar module output field square wave to off.

## 12. Check $K_{2T}$ Distortion

- a. Connect and set the test equipment as shown in Fig. 4-12 with the following exception:
  - (1) set the waveform monitor mag to  $.2 \mu\text{s}/\text{div}$ .
- b. Install graticule B on the waveform monitor and set the 1450-1 MANUAL GAIN control so the 2T pulse extends from the lower to the upper straight horizontal graticule lines.
- c. Set the waveform monitor volts full scale to 0.2. This calibrates the inner dashed graticule lines to 0.4% K and the outer dashed graticule lines to 1% K. See Fig. 4-13.

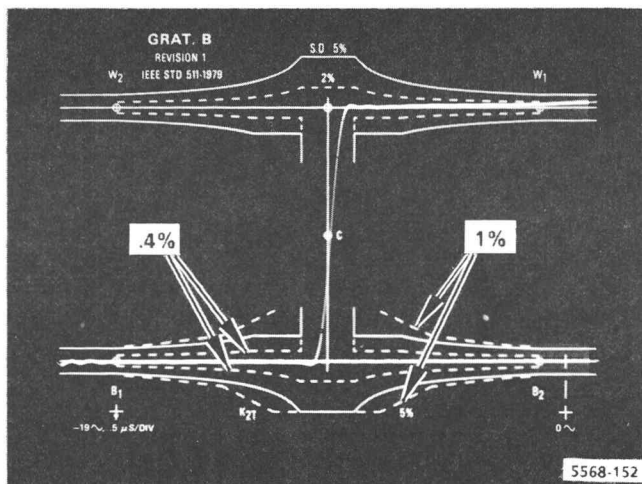


Fig. 4-13. Typical graticule 'B' display.

- d. **CHECK** that the  $K_{2T}$  distortion is 0.5% or less in all SYNCHRONOUS DETECTION modes with SOUND TRAP set to OUT.

- e. Remove graticule B from the waveform monitor.

### 13. Check Chrominance-to-Luminance Delay

- a. Connect and set the test equipment as shown in Fig. 4-12 with the following exception:
  - (1) set the waveform monitor mag to  $.2 \mu\text{s}/\text{div}$ .
- b. Install graticule A on the waveform monitor. Set the 1450-1 GAIN control so the 12.5T mod pulse blanking level is on the 0 IRE line and peak is at the 100 IRE line.
- c. Set the waveform monitor volts full scale to 0.2, and position the blanking level of the signal on the base line. The minor divisions are now calibrated for 0.4 IRE and the major divisions are calibrated to 2 IRE. See Fig. 4-14.

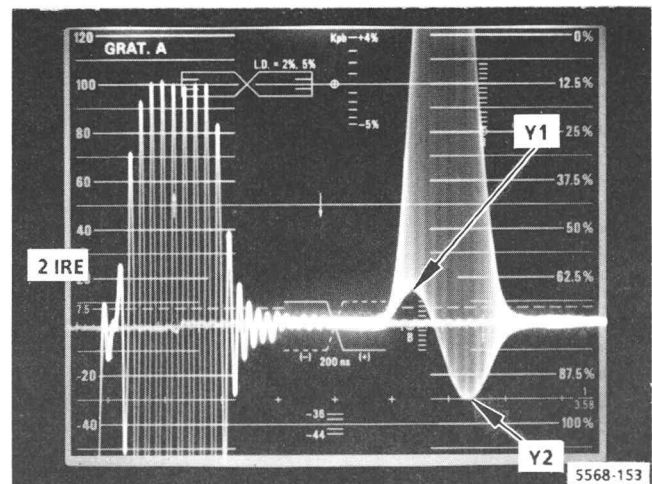


Fig. 4-14. Typical display when checking chrominance-to-luminance delay.

- d. Calculate the chrominance-to-luminance delay by measuring the baseline errors on the 12.5T modulated pulse. The sum of the left peak (Y1) and the right peak (Y2) will equal 1 IRE p-p for every 10 ns delay on the 12.5T mod pulse. See Fig. 4-14.

$$10 [Y1(IRE) + Y2(IRE)] = ns \text{ delay}$$

- e. **CHECK** that the chrominance-to-luminance delay is 20 ns (2 IRE p-p) or less in all

- e. **CHECK** that the chrominance-to-luminance delay is 20 ns (2 IRE p-p) or less in all DETECTION modes with SOUND TRAP set to IN and OUT.

#### 14. Check Line Time Non-Linearity

- a. Connect and set the test equipment as shown in Fig. 4-15.

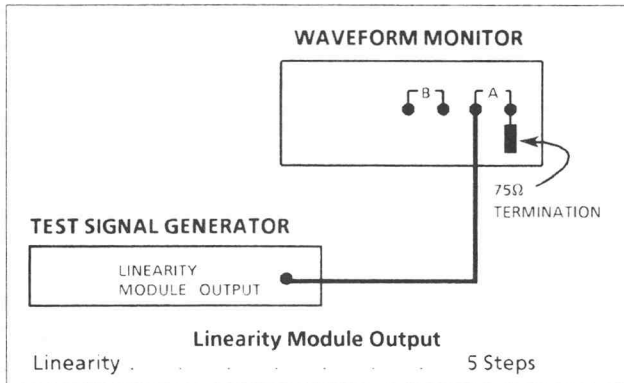


Fig. 4-15. Setup for checking source line time non-linearity.

- b. Set the waveform monitor volts full scale variable control so the smallest spike is 100 IRE in amplitude. This calibrates the divisions on the "R" scale to 2%. See Fig. 4-16.

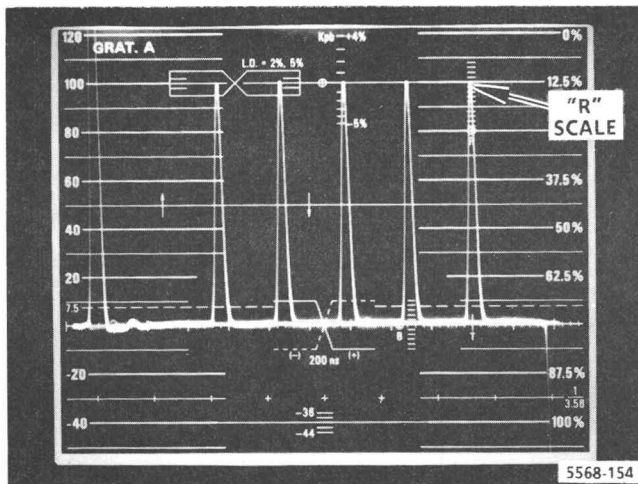


Fig. 4-16. Typical display when checking line time non-linearity.

- c. Measure and record the amplitude of the remaining spikes, in percent, on the "R" scale.
- d. Connect and set the test equipment as shown in Fig. 4-17.

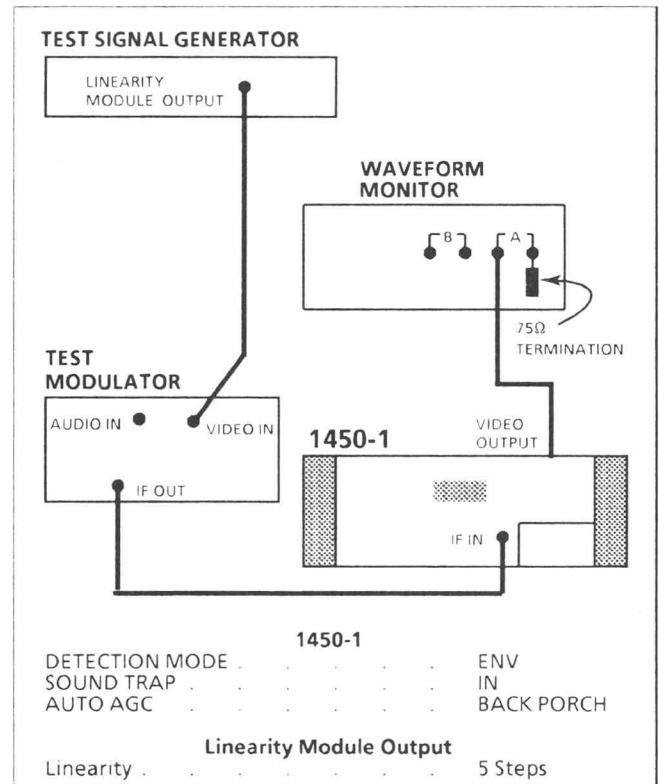


Fig. 4-17. Setup for checking line time non-linearity.

- e. Set the waveform monitor volts full scale variable control so the spike that was smallest in part b of this step is 100 IRE in amplitude.
- f. **CHECK** that the remaining spikes are within 1% of the 100 IRE graticule line, after subtracting the amount of error in the source generator, in all DETECTION modes with SOUND TRAP set to IN and OUT.

#### 15. Check Differential Gain

- a. Connect and set the test equipment as shown in Fig. 4-18.
- b. Set the vectorscope channel A gain vernier so the burst vector is at the outer graticule ring. Position the burst vector at the 180° graticule line with the channel A phase control.
- c. Set the vectorscope mode to diff gain, and use the vectorscope vertical position control to set the first luminance step to the 0% line as a reference.

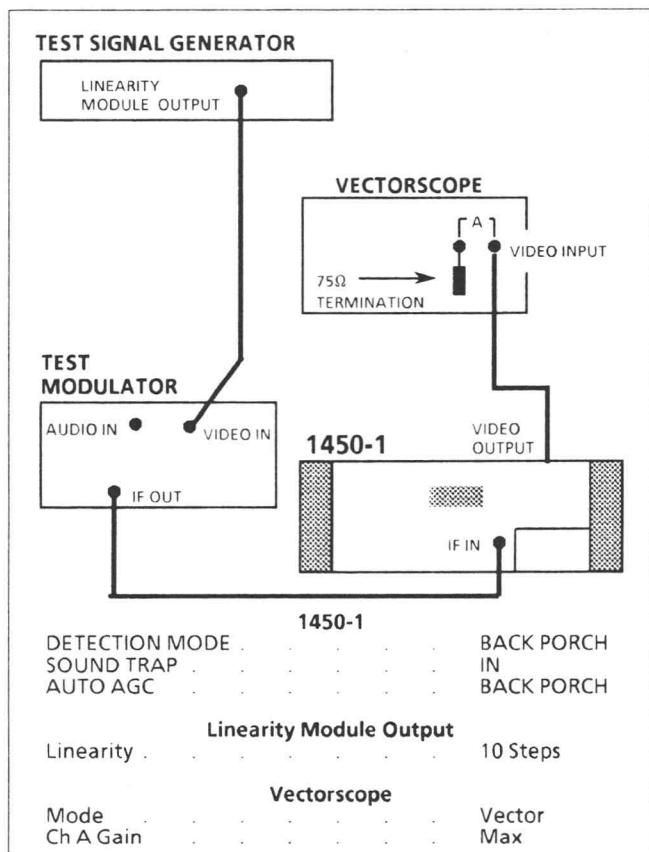


Fig. 4-18. Setup for checking differential gain.

- d. **CHECK** that the differential gain of the remaining luminance steps is 1% or less in all **SYNCHRONOUS DETECTION** modes with **SOUND TRAP** set to **IN** and **OUT**. See Fig. 4-19.

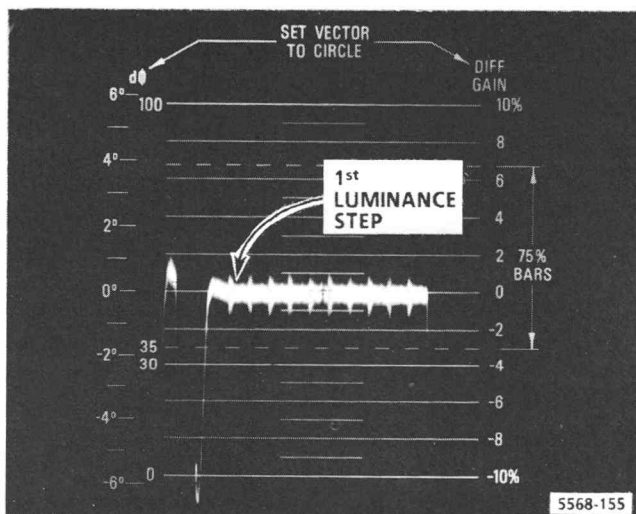


Fig. 4-19. Typical display when checking differential gain.

- e. Set the 1450-1 **DETECTION MODE** to **ENV** and reposition the reference step to the 0% line.
- f. **CHECK** that the differential gain of remaining luminance steps is 4% or less in **ENV DETECTION** with **SOUND TRAP** set to **IN** and **OUT**.

## 16. Check Differential Phase

- a. Connect and set the test equipment as shown in Fig. 4-20.

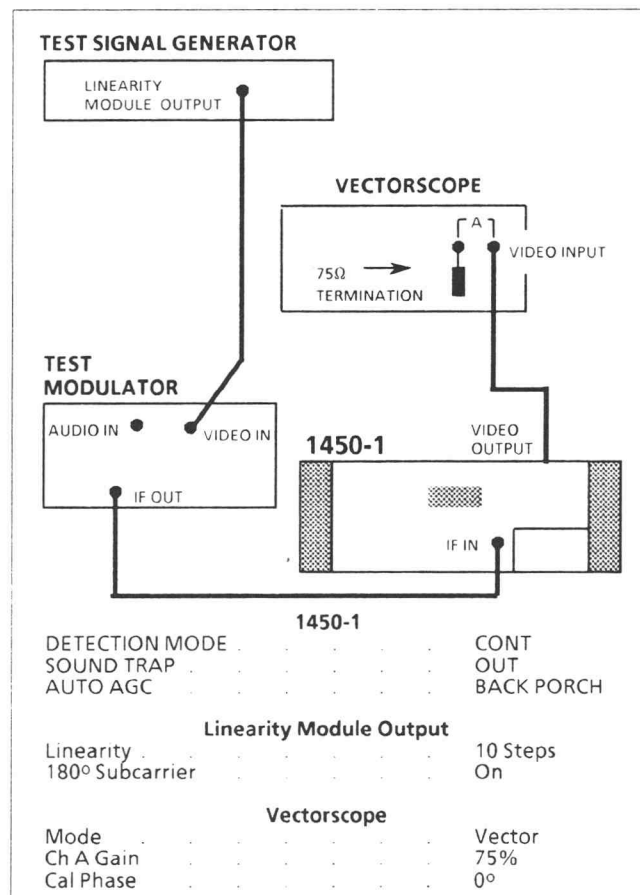


Fig. 4-20. Setup for checking differential phase.

- b. Set the vectorscope channel A phase control so the 180° subcarrier vector is at the 180° graticule line.
- c. Set the vectorscope mode to **diff phase**, **diff phase** switch to **double**, and use the channel A phase control to overlay the first luminance steps. See Fig. 4-21.



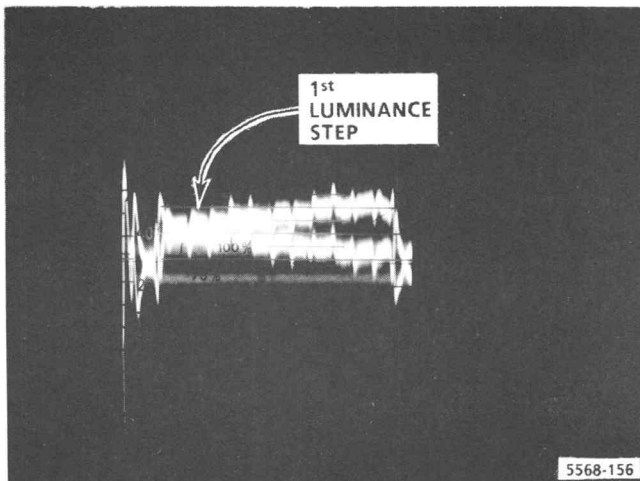


Fig. 4-21. Typical display when checking differential phase.

- d. Use the vectorscope cal phase control to overlay the two steps that are farthest apart.
- e. **CHECK** that the differential phase reading on the cal phase dial is  $1^\circ$  or less in all SYNCHRONOUS DETECTION modes with SOUND TRAP set to IN and OUT.
- f. Set the 1450-1 DETECTION MODE to ENV. Reset the vectorscope cal phase dial to  $0^\circ$ , and use the channel A phase control to overlay the first luminance steps.
- g. Use the vectorscope cal phase control to overlay the two steps that are farthest apart.
- h. **CHECK** that the differential phase reading on the cal phase dial is  $1^\circ$  or less in ENV DETECTION with SOUND TRAP set to IN and OUT.

#### 17. Check Aural Signal Rejection

- a. Connect the test modulator IF output to the spectrum analyzer rf input. Ensure there is no video input to the test modulator. Set the test modulator aural and visual carriers to on, and set the aural carrier level to 4 dB below the unmodulated visual carrier. See Fig. 4-22.
- b. Connect the test modulator IF output to the 1450-1 IF IN and connect the VIDEO OUT through a 5 MHz bandpass filter and 75 $\Omega$  in-line termination to the true rms

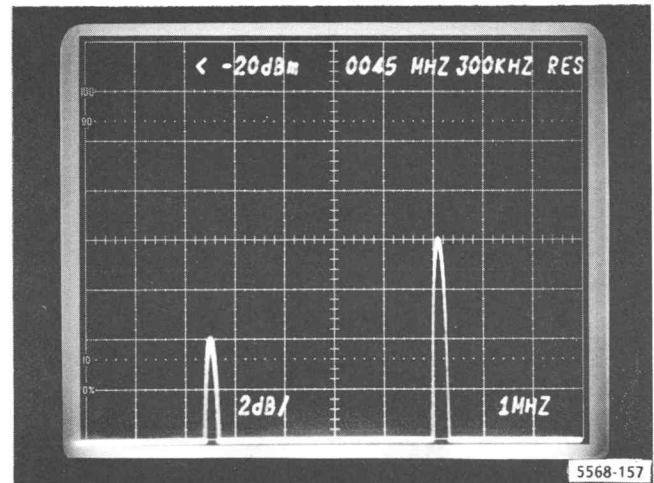


Fig. 4-22. Aural carrier 4 dB below unmodulated visual carrier.

voltmeter. Set the 1450-1 DETECTION to CONT, AUTO AGC to BACK PORCH, and SOUND TRAP to IN.

- c. **CHECK** that the readout on the true rms voltmeter is 1.26 mV rms or less.

#### 18. Check White Noise Video Signal-to-Noise Ratio

- a. Connect and set the test equipment as shown in Fig. 4-23.

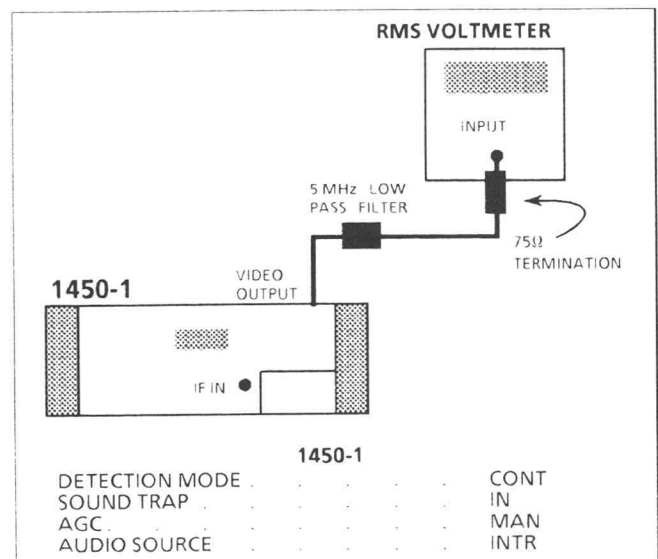


Fig. 4-23. Setup for checking white noise signal-to-noise ratio.

- b. Move the jumper on P60 on A58 Phase Lock Switch board to the TEST ONLY position (pins 2 & 3).
- c. Set the 1450-1 GAIN control so the RF INPUT SIGNAL LEVEL readout is -20 dBm.

- c. Set the 1450-1 GAIN control so the RF INPUT SIGNAL LEVEL readout is -20 dBm.
- d. **CHECK** that the true rms meter readout is 0.714 mV rms or less.
- e. Return the jumper on P60 to the NORMAL position.

**19. Check Low-Frequency Video Signal-to-Noise Ratio**

- a. Move the jumper on P60 on A58 Phase Lock Switch board to the TEST ONLY position (pins 2 & 3).
- b. Connect the 1450-1 VIDEO OUT through a 75 $\Omega$  in-line termination to the differential amplifier input. Set the differential amplifier high freq 3 dB point to 1 kHz. Set the 1450-1 AUTO AGC to BACK PORCH. Ensure there are no inputs to the 1450-1.
- c. **CHECK** that p-p noise at 60 Hz is .714 mV or less.

- d. Return the jumper on P60 to the NORMAL position.

**20. Check Low-Frequency Phase Noise**

- a. Connect and set the test equipment as shown in Fig. 4-24.
- b. Set the 1450-1 GAIN control so both input level LEDs are off.
- c. Remove the harmonica connector from P29 on A60 AGC board. Disconnect the video signal from the test modulator and connect it through a BNC-to-Square Pin adapter cable to pin 1 of P29 on A60 AGC board. Only the center conductor needs to be connected to P29.
- d. **CHECK** that the reading on the true rms voltmeter remains below 3.7 mV rms for 1 minute.
- e. Return the harmonica connector to P29 on A60.

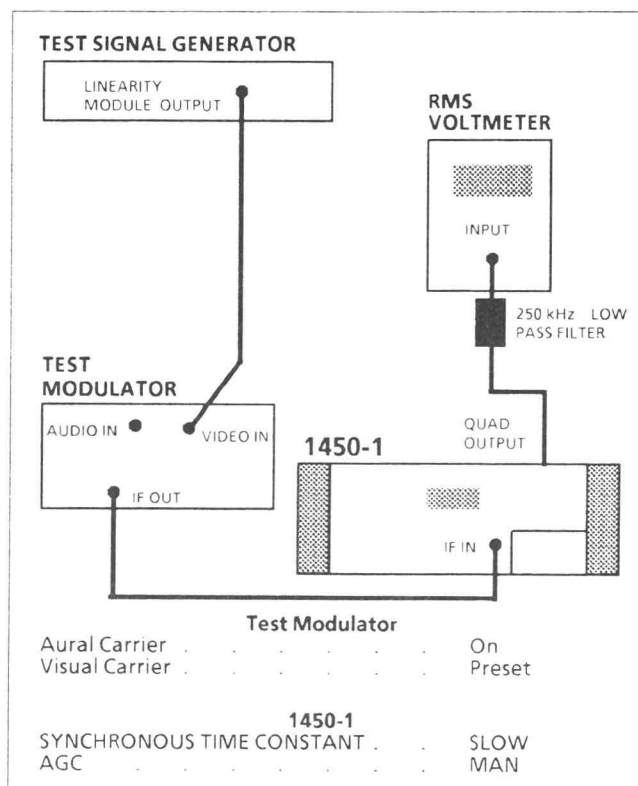


Fig. 4-24. Setup for checking low frequency phase noise.

**21. Check External Zero Carrier Reference Gate Duration and Cutoff**

- a. Connect and set the test equipment as shown in Fig. 4-25.
- b. Set the 1450-1 GAIN control so both Level LEDs are off.
- c. **CHECK** that the Zero Carrier Reference gate half amplitude duration is 30  $\mu$ s  $\pm$  10%.
- d. Connect the 1450-1 VIDEO OUT to the spectrum analyzer rf input. Set the spectrum analyzer reference level to 0 dB, freq span/div to 2 MHz, resolution to 300 kHz, and 30 kHz video filter to on.
- e. Note the level of the video signal. See Fig. 4-26.
- f. Connect comp sync from the test signal generator to the 1450-1 ZERO CARRIER REF DRIVE IN.



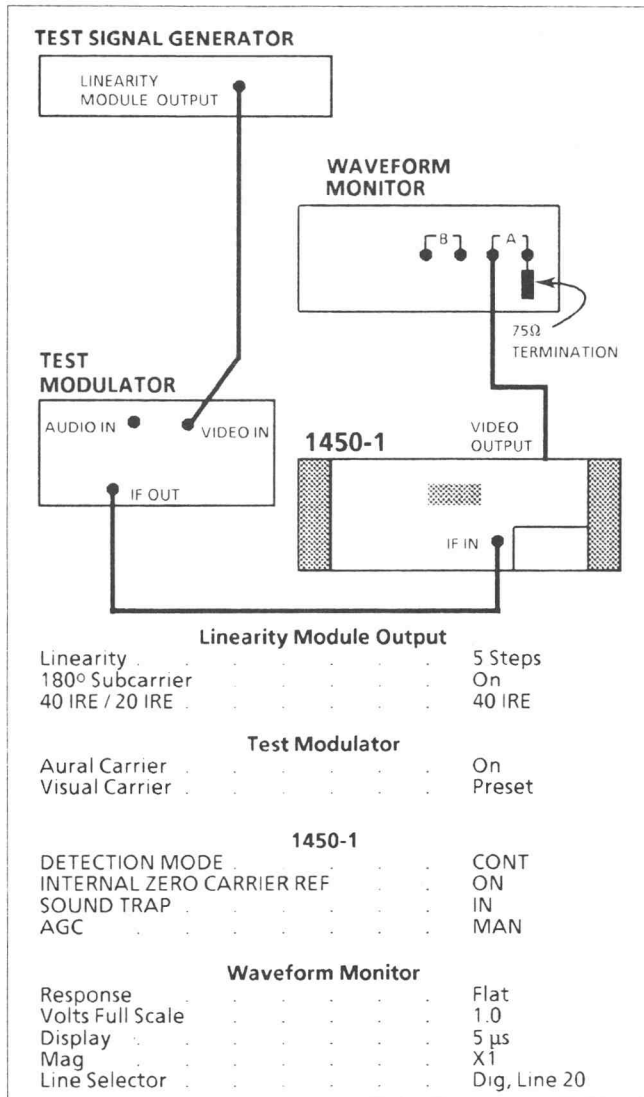


Fig. 4-25. Setup to check External Zero Carrier Reference gate.

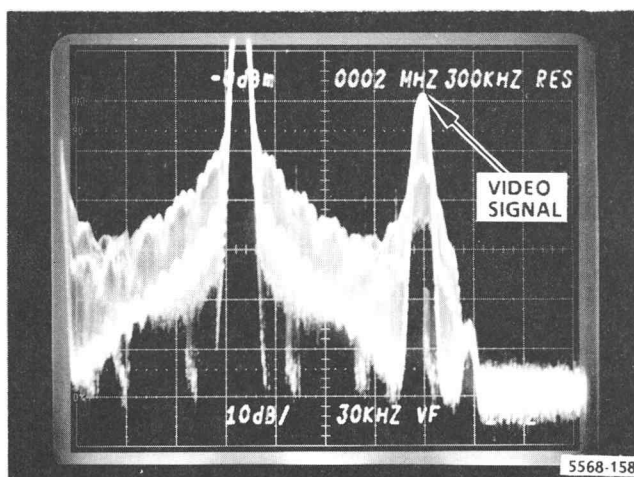


Fig. 4-26. Typical display of video signal.

- g. **CHECK** that the video signal noted in part e of this step is now attenuated by at least 50 dB. See Fig. 4-27.

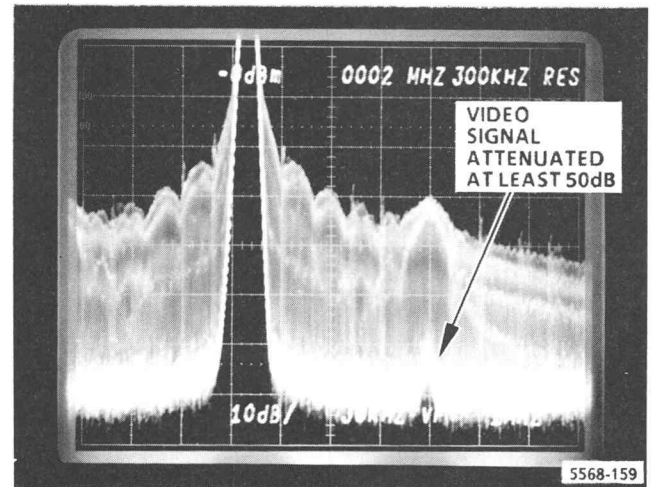


Fig. 4-27. Attenuated video signal.

## 22. Check Deviation Out and Audio Levels

### NOTE

*Parts a through e of this step set the first carrier null.*

- Connect the audio oscillator to the frequency counter and the rms voltmeter. Set the rms voltmeter resolution to 200 mV.
- Set the audio oscillator frequency to 10.395 kHz and output level to .177 V rms. Select the rms voltmeter low pass filter and note any change in the readout as error introduced by the filter.
- Connect and set the test equipment as shown in Fig. 4-28.
- Set the Test Modulator Aural Carrier Level control so the aural carrier is 4 dB below the unmodulated visual carrier. See Fig. 4-29. Then reset the spectrum analyzer mode to 10 dB/div, freq span/div to 10 kHz, and resolution to 3 kHz. Ensure the aural carrier is centered on the display. Set the audio oscillator variable attenuator for the first carrier null at the center frequency. See Fig. 4-30. This sets the Test Modulator IF Out for 25 kHz deviation.

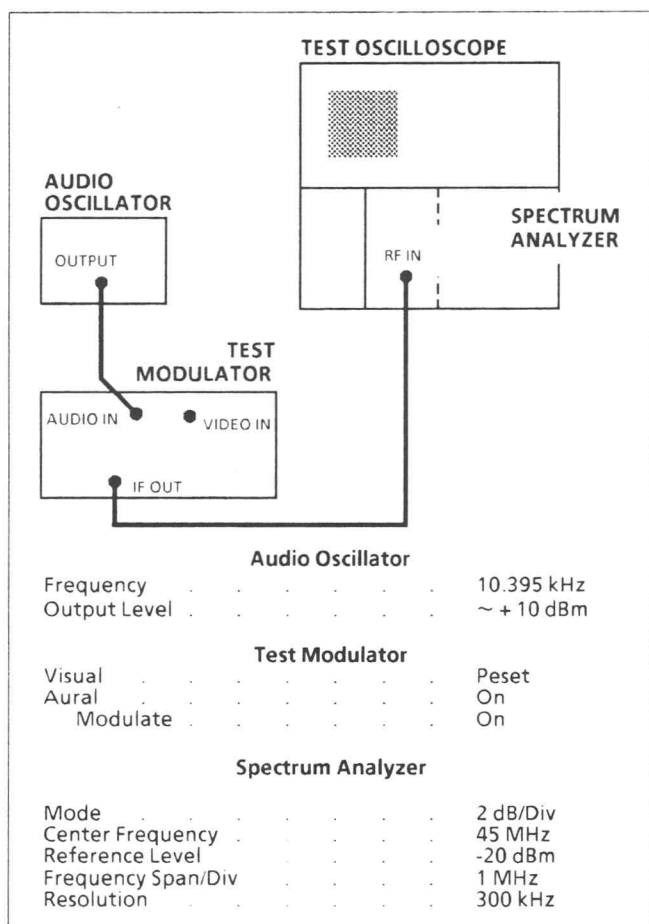


Fig. 4-28. Setup for obtaining 25 kHz deviation (1st carrier null).

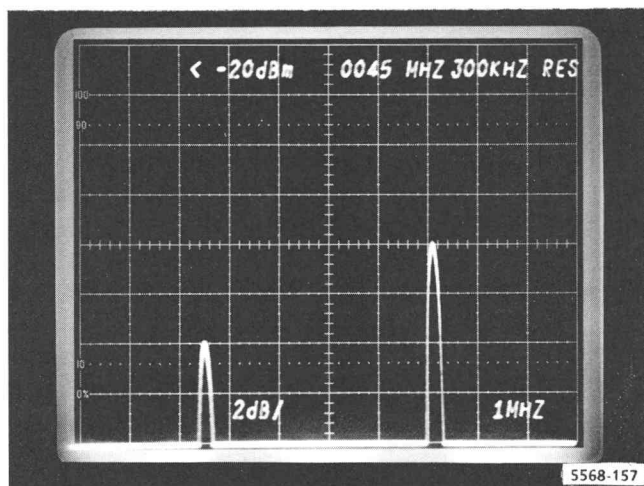


Fig. 4-29. Aural carrier 4 dB below unmodulated visual carrier.

**NOTE**

*Do NOT change the audio oscillator attenuator setting throughout the remainder of this step.*

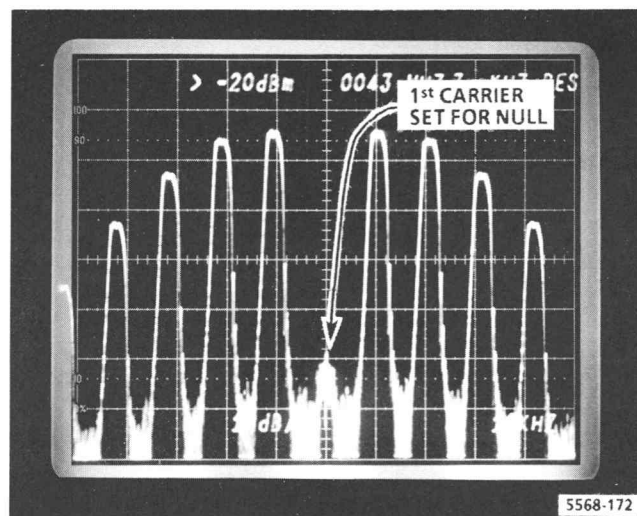


Fig. 4-30. 1st carrier null (25 kHz deviation).

- e. Connect the Test Modulator IF Out to the 1450-1 IF IN, and connect the 1450-1 AURAL INTERCARRIER OUT to the digital counter. Set the Test Modulator Aural IF Center Frequency so the AURAL INTERCARRIER OUT frequency is 4.5 MHz.
- f. Connect the DEVIATION OUT through a 75Ω precision termination to the rms voltmeter.
- g. **CHECK** that the DEVIATION OUT level is .177 mV  $\pm 1\%$ , including any error noted in part b of this step.
- h. Connect the 1450-1 600Ω BAL LINE output through the 600Ω matching switch (see Fig. 4-1 for details) to the rms meter.
- i. Move the jumper on J54 on A44 Audio Interface board to pins 2 & 3 (Narrow).
- j. **CHECK** for 1.225 mV  $\pm 1\%$  on both sides of the 600Ω BAL LINE output.
- k. Move the jumper on J54 on A44 to pins 1 & 2 (Wide).
- l. **CHECK** for 0.442 mV  $\pm 1\%$  on both sides of the 600Ω BAL LINE output.
- m. Connect the 8Ω SPEAKER output through the 8Ω-600Ω coupler (with the 30 dB attenuator switched out, see Fig. 4-2 for details) to the rms voltmeter, and set the AUDIO LEVEL control fully clockwise.

- n. **CHECK** for at least 6.32 V rms at the 8 $\Omega$  SPEAKER output.

### 23. Check Frequency Response

- Connect the audio oscillator to the rms voltmeter and the frequency counter. Set the audio oscillator frequency to 30 Hz and output level to 1.4 V rms. Set the rms voltmeter mode to dB and press the display rel button.
- Vary the audio oscillator to 1 kHz and then to 50 kHz in 10-kHz steps, recording the error (any deviation from the 0 dB reference) at each step. This record is a characterization of the meter's performance.
- Set the first carrier null using parts a through e of step 22.

#### NOTE

*Do not vary the audio oscillator output level through part k of this step. If by accident the output level is changed, return to part d of this step.*

- Connect the DEVIATION OUT through a 75 $\Omega$  precision termination to the rms voltmeter. Reset the audio oscillator to 30 Hz. Then set the rms voltmeter mode to dB and press the display rel button.
- Move the jumper on J47 on A44 to pins 2 through 5 (NOTCH OUT).
- CHECK** that when varying the audio oscillator frequency from 1 kHz to 50 kHz in 10-kHz steps, the DEVIATION OUT frequency response is flat within 0.1 dB of the 30 Hz reference, taking into account any error noted in part b of this step.
- Connect the 600 $\Omega$  BAL LINE output through the 600 $\Omega$  matching switch (see Fig. 4-1 for details) to the rms voltmeter. Select side 1 with the 600 $\Omega$  matching switch. Set the audio oscillator frequency to 30 Hz and press the display rel button.

- CHECK** that when varying the audio oscillator frequency from 1 kHz to 50 kHz in 10-kHz steps, the 600 $\Omega$  BAL LINE output frequency response is flat within 0.1 dB of the 30 Hz reference, taking into account any error noted in part b of this step.
- Repeat parts g and h of this step for side 2 of the 600 $\Omega$  BAL LINE output.
- Connect and set the test equipment as shown in Fig. 4-31.

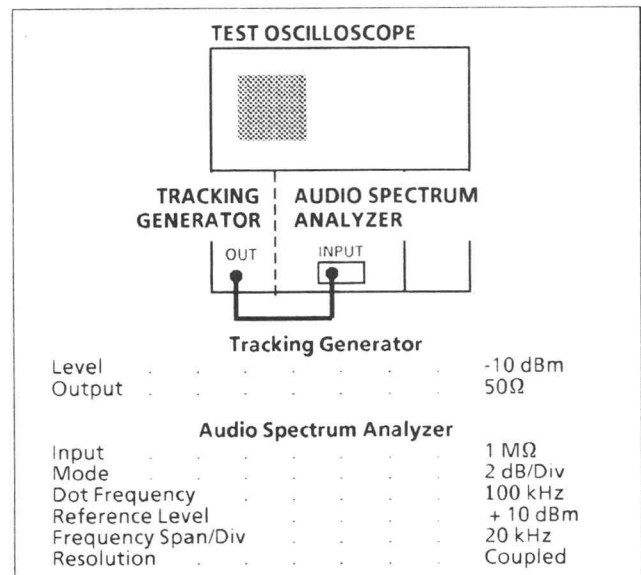


Fig. 4-31. Setup for characterizing the tracking generator audio spectrum analyzer.

#### NOTE

*This procedure was developed with a TEKTRONIX 7L5 Digital Storage audio spectrum analyzer. Part m of this step stores a trace that will be used in conjunction with the audio spectrum analyzer "B-(Save A)" function that characterizes the audio spectrum analyzer flatness. Always use the audio spectrum analyzer "B-(Save A)" function when monitoring flatness.*

- Position the trace in the top division of the display with the reference level control. Press "Display A" then "Save A" on the audio spectrum analyzer to store this trace as a reference. Turn "Display A" off. Do NOT change any spectrum analyzer controls through part s of this step except the reference level control.

- l. Connect and set the equipment as shown in Fig. 4-32.

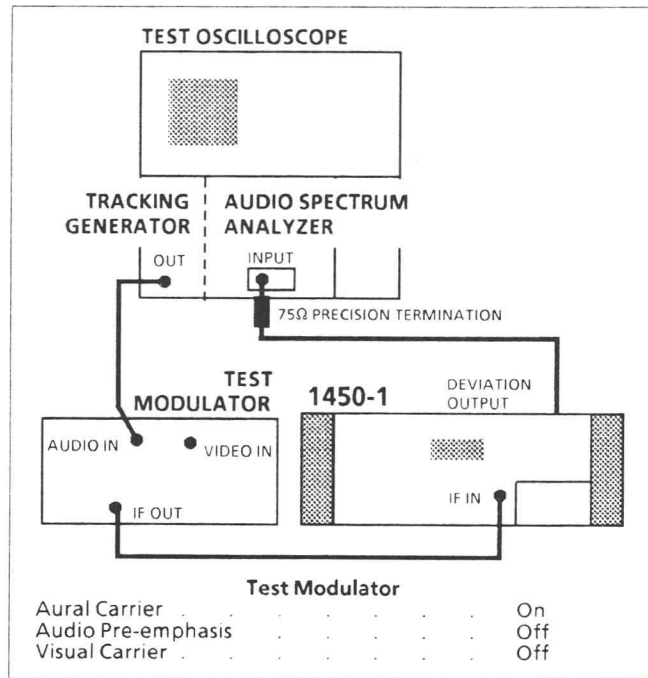


Fig. 4-32. Setup for checking wideband flatness.

- m. Position the waveform near the center of the screen using the reference level control, and turn "Display B" on. Then turn "B-(Save A)" on, and turn "Display B" off.
- n. **CHECK** that the DEVIATION OUT response is flat within 0.5 dB from 30 Hz to 150 kHz. See Fig. 4-33. Turn "B-(Save A)" off.

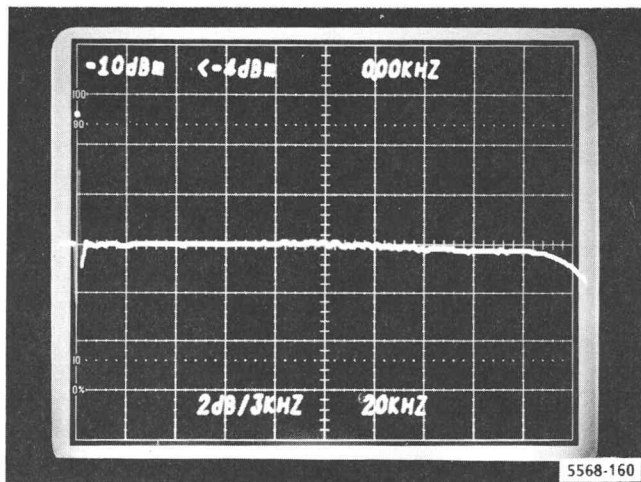


Fig. 4-33. Typical display when checking deviation out flatness.

- o. Connect the 600Ω BAL LINE output through the 600Ω matching switch.
- p. Position the waveform near the center of the screen using the reference level control, and turn "Display B" on. Then turn "B-(Save A)" on, and turn "Display B" off.
- q. **CHECK** that the response of both sides (switch between sides 1 and 2) of the 600Ω BAL LINE output are flat within 0.5 dB from 30 Hz to 150 kHz. Turn "B-(Save A)" and "Save A" off. Do NOT change any spectrum analyzer controls through part w of this step except the reference level control.
- r. Move the jumper on J54 on A44 to pins 2 & 3 (Narrow), and reconnect the tracking generator output to the spectrum analyzer input. Set the dot frequency to 10 kHz and the frequency span/div to 5 kHz. Position the trace within the top division of the screen with the reference level control. Press "Display A" then "Save A" on the audio spectrum analyzer to store this trace as a reference. Turn "Display A" off.
- s. Connect the equipment as shown in Fig. 4-32, except connect the 600Ω BAL LINE output to the spectrum analyzer audio input.
- t. Position the waveform near the center of the screen using the reference level control, and turn "Display B" on. Then turn "B-(Save A)" on, and turn "Display B" off.
- u. **CHECK** that the response of both lines (switch between sides 1 and 2) of the 600Ω BAL LINE output are flat within 0.4 dB from 30 Hz to 20 kHz. Turn "B-(Save A)" off.
- v. Connect the 8Ω SPEAKER output through the 8Ω-to-600Ω coupler (with the 30 dB attenuator switched out, see Fig. 4-2 for details) to the audio spectrum analyzer input. Position the waveform near the center of the screen using the reference level control, and turn "Display B" on. Then turn "B-(Save A)" on, and turn "Display B" off.

- w. **CHECK** that the 8Ω SPEAKER output response is flat within 0.4 dB from 30 Hz to 20 kHz. Turn "B-(Save A)" and "Save A" off.
- x. Move the jumper on J54 on A44 back to pins 1 & 2 (Wide) and, unless proceeding to the next step, move the jumper on J47 on A44 to pins 1 through 4 (NOTCH IN).

#### 24. Check De-Emphasis Audio Frequency Response

- a. Set the test equipment controls as described in Fig. 4-34.
- b. Connect the tracking generator output to the audio spectrum analyzer input.
- c. Position the trace in the top division of the display and press "Display A" then "Save A." Then turn "Save A" off. This saves the tracking generator output as a reference for measurements in this step.
- d. Connect the equipment as shown in Fig. 4-34.
- e. Ensure the jumper on J47 on A44 is on pins 2 through 5 (NOTCH OUT).
- f. Press "B-(Save A)".
- g. **CHECK** that the de-emphasis response is flat within 0.5 dB from 30 Hz to 15 kHz.
- h. Move the jumper on J47 back to pins 1 through 4 (NOTCH IN).

#### 25. Check Total Harmonic Distortion

- a. Set the first carrier null using parts a through e of step 22.
- b. Connect the DEVIATION OUT to the audio spectrum analyzer. Set the audio spectrum analyzer input to 75Ω, frequency span/div to 5 kHz, and the dot frequency to 0 kHz.

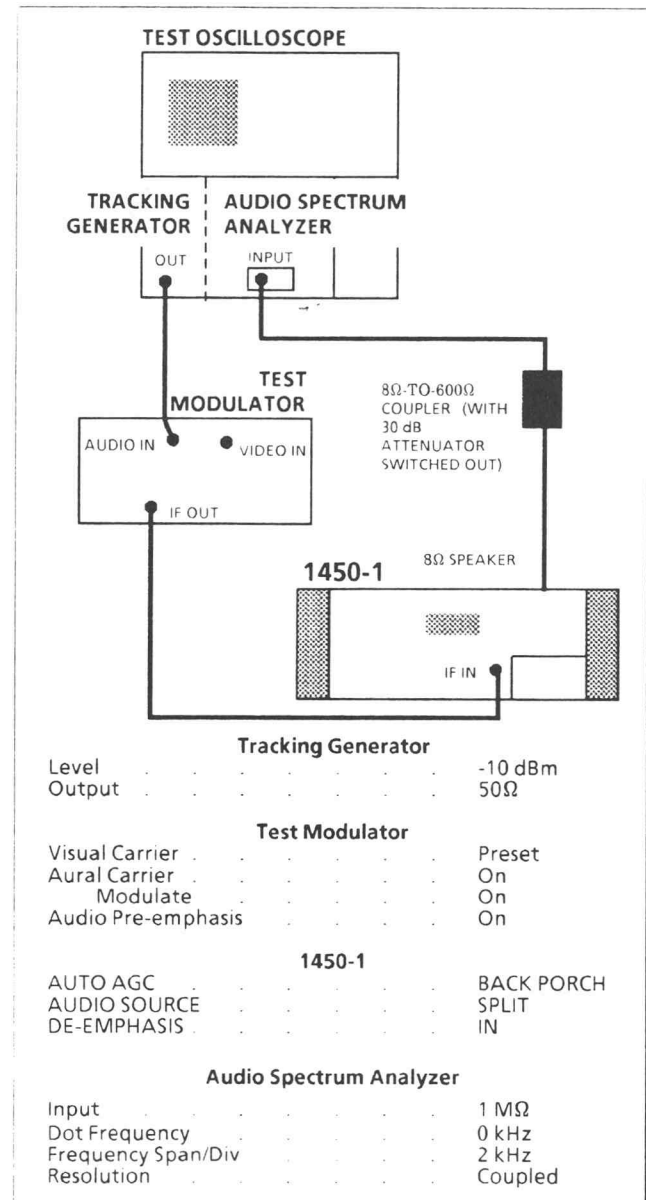


Fig. 4-34. Setup for checking audio de-emphasis frequency response.

- c. **CHECK** that while varying the audio oscillator frequency from 30 Hz to 15 kHz, the total harmonic distortion is at least 60 dB down from the fundamental between 30 Hz and 50 kHz.

To calculate total harmonic distortion, find the level of the largest, second largest, etc, harmonics. Use Table 4-4 to find the value (or values) to be subtracted from the level of the largest harmonic.

**Table 4-4**  
**TOTAL HARMONIC DISTORTION**  
**CALCULATIONS**

dB difference	subtract (dB)
0	3.01
1	2.54
2	2.13
3	1.76
4	1.46
5	1.19
6 or less	0.00

For example, if the largest harmonic is 63 dB down, the second is 66 dB down, and the third is 68 dB down, then the difference between the largest and second largest is 3 dB, and the difference between the largest and the third largest is 5 dB. According to Table 4-4, a 3 dB difference means subtract 1.76 dB from the largest and a 5 dB difference means subtract 1.19 from the remainder. Therefore, the total harmonic distortion is:

$$63 \text{ dB} - 1.76 \text{ dB} - 1.19 \text{ dB} = 60.05 \text{ dB}$$

- d. Set the spectrum analyzer frequency span/div to 20 kHz.
- e. **CHECK** that while varying the audio oscillator frequency from 15 kHz to 60 kHz, the total harmonic distortion is at least 46 dB down from the fundamental between 50 Hz and 120 kHz. Use Table 4-4 to calculate total harmonic distortion.

## 26. Check Signal-to-Noise Ratio

- a. Set the first carrier null using parts a through e of step 22.
- b. Connect the DEVIATION OUT through the 130 kHz noise filter (see Fig. 4-3) to the rms voltmeter. Set the rms voltmeter mode to dB, ensure the low pass filter is out, and press the display rel button.

- c. Set the Test Modulator Aural IF carrier to Crystal and set the 1450-1 AUDIO SOURCE to SPLIT.
- d. **CHECK** that the rms noise level is -50 dB or less.
- e. Set the AUDIO SOURCE to INTR.
- f. **CHECK** that the rms noise level is -50 dB or less.
- g. Set the AUDIO SOURCE to Q-P.
- h. **CHECK** that the rms noise level is -50 dB or less.
- i. Connect the rf signal generator rf output to the AURAL INTERCARRIER INPUT. Set the rf signal generator output level to -35 dBm and frequency to 4.5 MHz.
- j. Set the 1450-1 AUDIO MODE to external by pressing INTR and SPLIT simultaneously.
- k. **CHECK** that the rms noise level is -50 dB or less.

## 27. Check Aural Alarm

- a. Connect the Test Modulator IF Out to the 1450-1 IF IN. Connect the 1450-1 VIDEO OUT to the spectrum analyzer. Set both the Visual and Aural carriers to On, and set the Aural Carrier Level control fully clockwise.
- b. Reduce the Aural Carrier level until the AURAL CARRIER LOSS LED lights.
- c. **CHECK** that the aural carrier is at least 15 dB below the visual carrier.

## 28. Check Aural Intercarrier

- a. Connect and set the test equipment as shown in Fig. 4-35.
- b. Ensure there is a 4.5 MHz signal on the spectrum analyzer. The level of this signal will depend on the setting of the Test Modulator Aural Carrier Level.



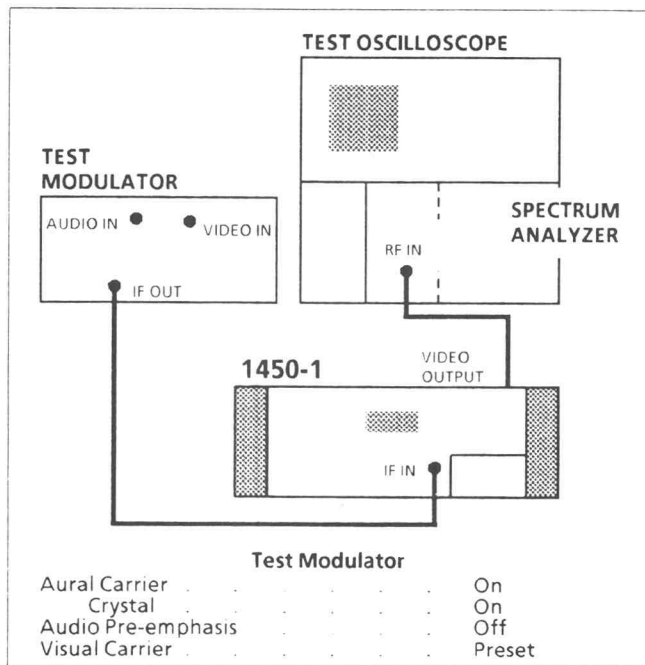


Fig. 4-35. Setup for checking Aural Intercarrier.

- c. Set the 1450-1 AUDIO SOURCE to external (depress both SPLIT and INTR).
- d. **CHECK** that the 4.5 MHz AURAL INTERCARRIER OUTPUT level is 0 dBm  $\pm$  6 dBm.

## 29. Check Return Loss

- a. Connect and set the test equipment as shown in Fig. 4-36.
- b. Move the jumper on P60 on A58 Phase Lock Switch to TEST ONLY. Set the 1450-1 AGC to MAN and set the GAIN control fully counterclockwise.
- c. Set the spectrum analyzer controls to position the tracking generator signal on the top horizontal graticule line. Then connect the VSWR bridge device under test port directly (with no cable) to the 1450-1 IF INPUT.
- d. Check that the signal is attenuated at least 18 dB across the IF bandpass (1450-1 IF frequency + 1.75 MHz, -5.25 MHz).
- e. Reset the spectrum analyzer center frequency to 4.5 MHz and the frequency span/div to 100 kHz. Reset the reference

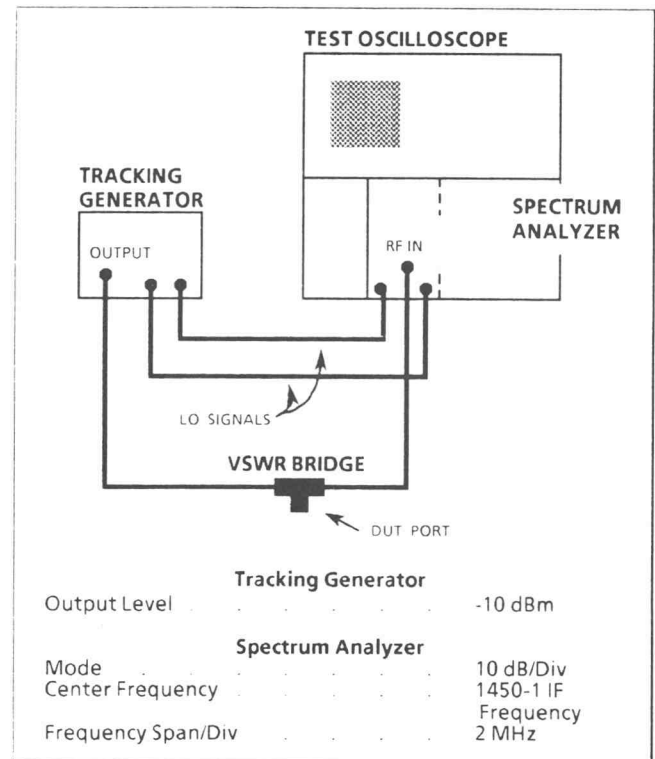


Fig. 4-36. Setup for checking high frequency return loss.

level on the spectrum analyzer if necessary, and then connect the VSWR bridge to the INTERCARRIER INPUT.

- f. **CHECK** that the signal is attenuated at least 20 dB from 4.3 MHz to 4.7 MHz.
- g. Set the 1450-1 AUDIO SOURCE to external (press SPLIT and INTR simultaneously). Then connect the VSWR bridge to the INTERCARRIER OUTPUT.
- h. **CHECK** that the signal is attenuated at least 20 dB from 4.3 MHz to 4.7 MHz.
- i. Connect and set the test equipment as shown in Fig. 4-37.
- j. Remove the termination from the unknown arm of the bridge and set the signal from the multiburst module output at the top horizontal graticule line. Replace the termination and set the return loss bridge balance adjustment to minimize the signal on the spectrum analyzer.

- k. Remove the termination from the unknown arm of the bridge and connect it to the QUADRATURE output.
- l. **CHECK** that the signal is attenuated by at least 34 dB as the multiburst module output frequency control is varied from stop to stop (100 kHz to 6 MHz).

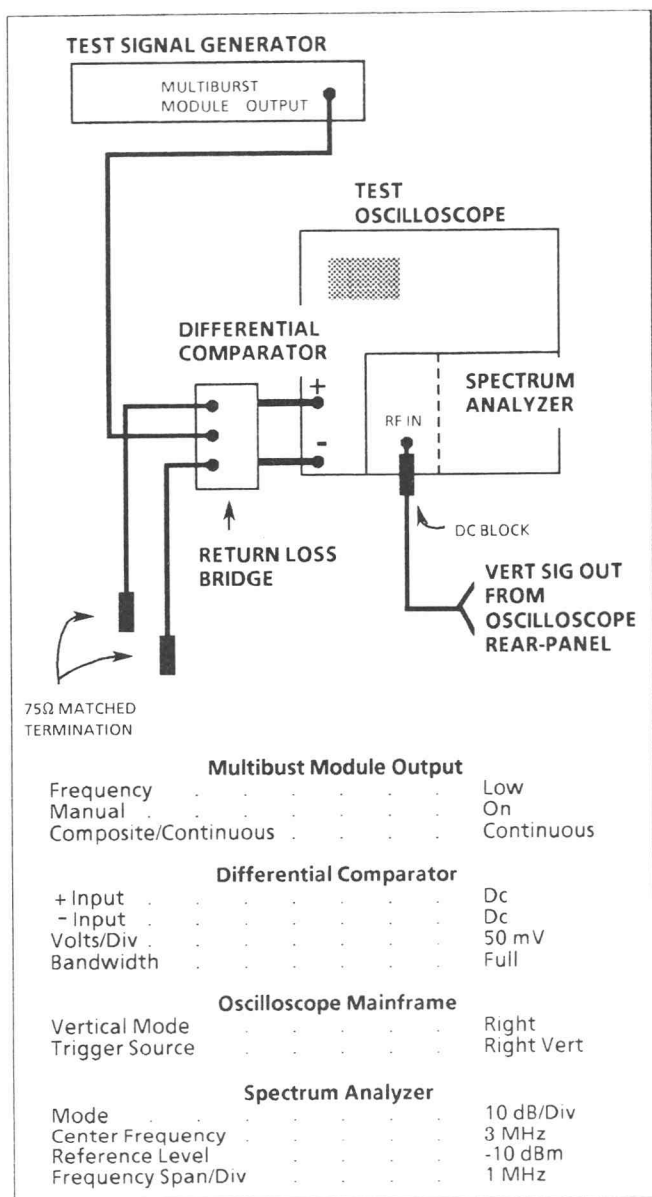


Fig. 4-37. Setup for checking return loss.

- m. Repeat part l of this step for both VIDEO outputs.



# ADJUSTMENT PROCEDURE

## SHORT FORM ADJUSTMENT PROCEDURE

## PAGE #

## PAGE #

1. Adjust Power Supply (R66 on A70)	4-26	20. Adjust IF Delay (L98 on A27)	4-38
2. Adjust AGC Low Pass Filter (L28 and L38 on A60)	4-26	21. Adjust Temperature Tracking Balance (R60 and R70 on A50)	4-38
3. Adjust AGC Current (R59, R58, R57, R55, and R33 on A60)	4-27	22. Adjust Narrow Band and Wide Band Linearity (R50 and R40 on A50)	4-39
4. Adjust A/D Cal (C94 on A61)	4-28	23. Adjust Overall Flatness (C70 on A26)	4-39
5. Adjust Reference Oscillator (L03 and L41 on A51)	4-28	24. Adjust Switch Current Balance (R72 on A27)	4-39
6. Adjust Converter LO (L03, L41, and C84 on A57)	4-28	25. Adjust Fine AGC (R47 on A60)	4-39
7. Adjust Phase Shifter Quadrature (L98 on A52)	4-29	26. Adjust Video Amp DC Level (R60 on A29)	4-41
8. Adjust IF Atten/Amp Bias (R46 on A21)	4-29	27. Adjust Sync Tip Level (R17 on A60)	4-41
9. Adjust IF Filter (L22, L32, L45, L52, L62, C35, and C55 on A20)	4-29	28. Adjust IF Atten/Amp Gain (R51 on A21)	4-42
10. Adjust IF Mixer Filter (L33, L36, and C48 on A22)	4-32	29. Adjust Narrow IF SAW Amp Gain (R93 on A24)	4-42
11. Adjust 24 MHz Bandpass Filter (L58, L54, L51, L61, C48, C44, and C41 on A23)	4-32	30. Adjust IF Post Amp Gain (R41 on A26)	4-42
12. Adjust Video Detector and Quadrature Detector Low Pass Filters (L44, L54, and L64 on A29 and A28)	4-33	31. Adjust Wide IF SAW Amp Gain (R93 on A25)	4-42
13. Adjust Video Detector and Quadrature Detector Balance (R11 on A29 and A28)	4-34	32. Adjust Overall Flatness (C70 on A26)	4-43
14. Adjust IF Mixer Balance (C63 and R51 on A22)	4-35	33. Adjust Q-P Filter (L70, L50, L30, and L01 on A45)	4-43
15. Adjust Video-to-Quadrature Phase (L48, C10, and L13 on A27)	4-36	34. Adjust 4.5 MHz Input and Output Bandpass Filters (T17 and T31 on A41)	4-43
16. Adjust Quadrature DC Level (R60 on A28)	4-37	35. Adjust 28.5 MHz and Aural Alarm Bandpass Filters (L62, L66, and C45 on A40)	4-45
17. Adjust Phase Sampler Balance (C01 on A52)	4-37	36. Adjust Output Amp Bias (R58 on A44)	4-46
18. Adjust Quadrature Carrier Phase (C10 on A27)	4-37	37. Adjust 1 MHz Bandpass Filter (L45, L55, L75, and L95 on A42)	4-46
19. Adjust Limiter (R00, R30, and R50 on A55)	4-38	38. Adjust DEVIATION OUT and Aural Mode Center Frequency (R81 and R30 on A43)	4-47
		39. Adjust 600 $\Omega$ Balanced Line Output Level (R54 on A44) and Narrowband Gain (R71 on A43)	4-48
		40. Adjust Q-P Limiter (R50, R30, and R00 on A46)	4-48
		41. Adjust Notch Filter (R59 on A44)	4-49

## ADJUSTMENT PROCEDURE

### 1. Adjust Power Supply (R66 on A70 Power Supply board)

#### **NOTE**

*Refer to the Component Locations A70 opposite Diagram 14 in Section 8 for interconnect plug locations.*

- a. Monitor P80-1 on A70 Power Supply board with the DVM.
- b. Adjust R66 (-15 V Adjust) for  $-15\text{ V} \pm 0.5\%$  as indicated on the DVM.
- c. Connect the DVM to P30-1 and check that the  $+5\text{ V}$  power supply is within 1%.
- d. Connect the DVM to P10-1 and check that the  $+15\text{ V}$  power supply is within 1%.

#### **NOTE**

*Many of the following adjustments are on circuit boards mounted inside shields. To access these adjustable components, the circuit board must be installed in the 1450-1 on an Extender board.*

*An Extender board (670-5034-00) is included in the Standard Accessories Kit.*

*To observe the output of a particular circuit board, remove the circuit board which it drives. Then connect the BNC-to-Square Pin adapter cable to the input pins at the location of the circuit board just removed. Also, the input of a particular circuit board may be driven by an external signal. This is done by removing the circuit board that ordinarily drives the board you wish to drive. Then connect your external drive signal through the BNC-to-Square Pin adapter cable to the output pins at the location of the board just removed.*

*Each housing-mounted board has a small tooling hole for extracting the board from the housing. A small screwdriver or the tip of a pair of needle-nose pliers can be inserted in the tooling hole and used as a*

*lever against the housing to remove the board.*

#### **CAUTION**

*When a spectrum analyzer is used to monitor square pins on an interface board, caution must be taken not to connect the square pin end of the BNC-to-Square Pin adapter cable across power supply pins. Dc voltages applied to the input of the spectrum analyzer will destroy the mixer in the spectrum analyzer. Use a dc-blocking capacitor (Tektronix Part No. 015-0221-00) at the input of the spectrum analyzer wherever there is doubt of the dc level of the signal to be monitored.*

### 2. Adjust AGC Low Pass Filter (L28 and L38 on A60 AGC Control board)

- a. Remove the A61 Readout Driver board from the 1450-1 to access the A60 AGC Control board using the following steps (refer to Fig. 8-9 in this manual for harmonica connector and screw locations on the Readout Driver board):

- (1) Set the 1450-1 POWER control to OFF. Remove all harmonica connectors from A61.
- (2) Remove the two phillips head screws from the rear corners of A61.
- (3) Remove A61 from the Readout board by gently sliding A61 toward the rear of the 1450-1.

- b. Remove the harmonica connector from P29 on A60 AGC Control board. Connect the linearity test signal generator output through the BNC-to-Square Pin adapter cable to pin 1 of P29 using only the center conductor. Set the linearity test signal generator controls for a 100-IRE flat field output.

- c. Set the 1450-1 POWER to ON.

- d. Connect a 10X probe from the test oscilloscope vertical amplifier to TP27 on A60. Set the test oscilloscope volts/div to 10 mV and time/div to 5  $\mu\text{s}$ . Externally

trigger the test oscilloscope with composite sync from the test signal generator. Use the test oscilloscope vertical position control to display the leading edge of the waveform.

- e. **ADJUST** L28 and L38 for the best transient response on the leading edge of the waveform on TP27. Refer to Fig. 8-9 for adjustment locations, and see Fig. 4-38 for typical waveforms.

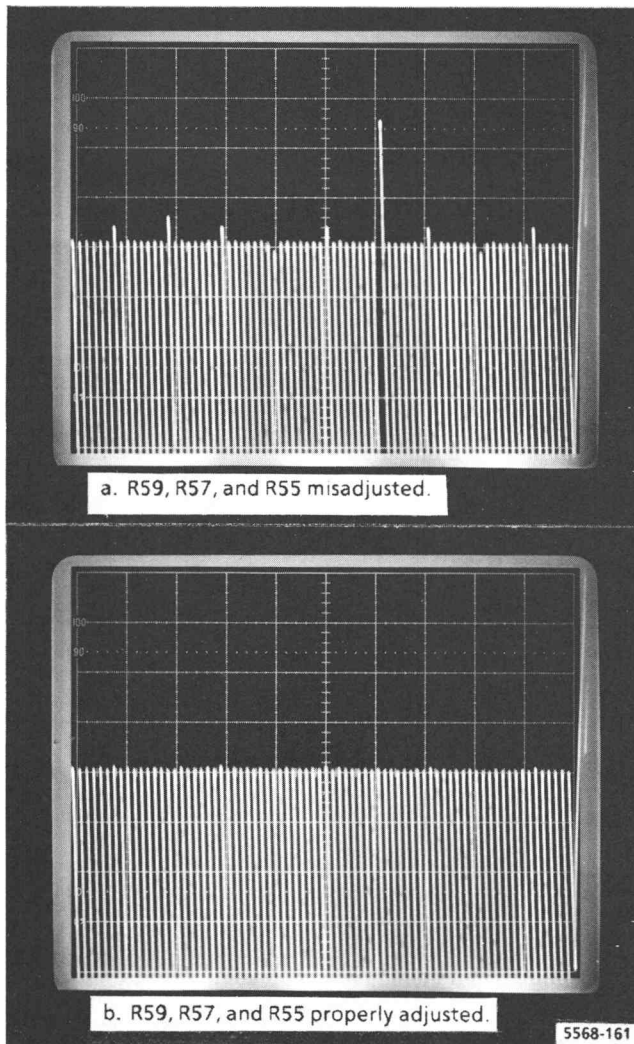


Fig. 4-38. AGC current adjustment (LSBs).

- f. Return the harmonica connector to P29 on A60, and reinstall A61, unless proceeding to step 3.

### 3. Adjust AGC Current (R59, R58, R57, R55, and R33 on A60 AGC Control board)

- a. Set the function generator frequency to 5 Hz, function to triangle waveform, and amplitude to 10 V p-p, as monitored on the test oscilloscope. Set the function generator offset control so the triangle waveform varies between 0 Vdc and +10 Vdc.
- b. Remove the harmonica connector from P28 on A60. Install the 10 k $\Omega$  test jumper on pins 1 & 3 of P28 (see Fig. 4-4 for construction details). Connect the function generator output through the BNC-to-Square Pin adapter cable to pin 2 of P28 using only the center conductor.
- c. Monitor TP45 on the AGC Control board with a 10X probe from the test oscilloscope. Use a differential comparator as the test oscilloscope vertical plug-in.
- d. Set the test oscilloscope volts/div to 200 mV, +Input to DC, -Input to VC, and time/div to 10 ms. Externally trigger the test oscilloscope with the function generator trigger output.
- e. Set the 1450-1 AUTO AGC to Manual and set the AGC SPEED control fully counterclockwise.
- f. **ADJUST** R59, R58, R57, and R55 (in that order) so no LSBs (spikes) protrude from the top of the displayed field. See Fig. 4-38 for typical displays.
- g. Reset the test oscilloscope time/div to 20 ms.
- h. **ADJUST** R33 so the corners of the two displayed fields just touch. See Fig. 4-39.
- i. Remove the BNC-to-Square Pin adapter cable and 10 k $\Omega$  test jumper from P28 and return the harmonica connector to P28.
- j. Replace the A61 Readout Driver board by reversing the removal procedure at the beginning of step 2.

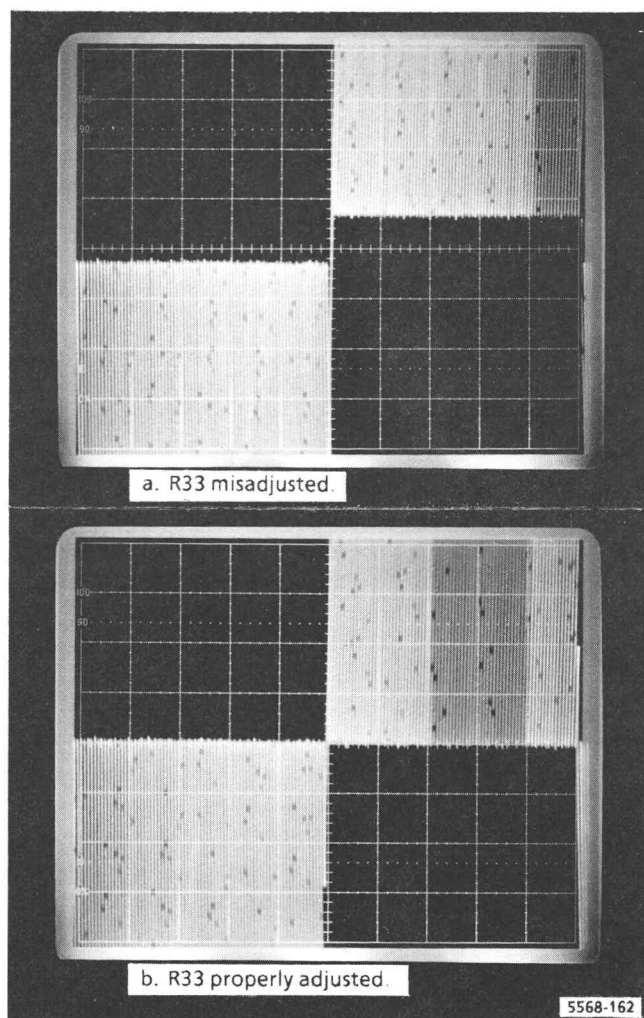


Fig. 4-39. AGC current adjustment.

#### 4. Adjust A/D Cal (C94 on A61 Readout Driver board)

- Monitor TP67 on A61 with a 10X probe. Set the test oscilloscope mainframe controls for maximum intensity and minimum scale illumination. Set the vertical amplifier for 2 V/div deflection and set the time base trigger mode to norm, slope to "+", and time/div to 10  $\mu$ s.
- Set the 1450-1 GAIN to MAN. Set the GAIN control fully clockwise, then rotate the GAIN control slowly counterclockwise until the greatest number of pulses are generated.
- ADJUST** C94 on A61 so only 14 pulses are generated, with the 14<sup>th</sup> pulse just appearing.

#### 5. Adjust Reference Oscillator (L03 and L41 on A51 Reference Oscillator board)

##### NOTE

*Oscillators on two circuit boards will need to be slightly misadjusted while extended to compensate for a change in operation on the Extender board. The necessary amount of misadjustment can be determined by noting the difference in the oscillator's frequency when extended and installed in the shield.*

- Remove U56 from A50 Reference Control board, and monitor TP91 with the test oscilloscope. This signal will be a 6.5 V square wave.
- ADJUST** L03 on A51 for a square wave with a period of at least 66  $\mu$ s in duration at TP91.
- Remove the cable from P89 on A58 Phase Lock Switch board. Monitor P89 with the spectrum analyzer using the BNC-to-Peltola adapter cable.
- Set the 1450-1 AUDIO SOURCE to SPLIT and set the spectrum analyzer center frequency to 24 MHz and frequency span/div to 1 MHz.
- ADJUST** L41 on A51 for maximum power at P89 (typically 0 dBm or slightly greater).
- Repeat parts b through e of this step as necessary.
- Reinstall A51 and ensure the pulse on TP91 is still at least 66  $\mu$ s in duration.
- Return the cable to P89 on A58 and replace U56 on A50.

#### 6. Adjust Converter LO (L03, L41, and C84 on A57 Converter Oscillator board)

- Remove A53 Converter Phase Lock board and connect pins 5 (CNVTCNTRL) & 6 (GND) inside the A53 shield with a shorting jumper.

- b. Monitor TP70 on A56 Converter Control board with the test oscilloscope. Set the oscilloscope Coupling to ac and time/div to 10  $\mu$ s. The displayed signal will be a sine wave approximately 1 V p-p in amplitude.
- c. **ADJUST** L03 so the duration of one cycle of the sine wave is at least 66  $\mu$ s.
- d. Remove the cable from P97 on A59 Phase Lock Interface board. Monitor P97 with the spectrum analyzer using the BNC-to-Peltola adapter cable. Set the spectrum analyzer Freq Span/div to 2 MHz; Resolution to 300 kHz; time/div to 10 ms; reference level to +20 dB; vertical mode to 2 dB/div. Set the spectrum analyzer center frequency as indicated in Table 4-5.

Table 4-5  
CONVERTER L.O. FREQUENCY

1450 OPTION	VISUAL IF	SPECTRUM ANALYZER CENTER FREQUENCY
1	37 MHz	61 MHz
2	38.9 MHz	62.9 MHz
3	45.75 MHz	69.75 MHz

- e. **ADJUST** L41 and C84 on A57 for maximum power at P97 (typically +18 dBm).
  - f. Return the cable to P97 on A59.
  - g. Reinstall A57 and ensure the duration of one cycle of the sine wave is still at least 66  $\mu$ s.
  - h. Remove the shorting jumper from pins 5 & 6 inside the A53 shield and reinstall A53.
7. **Adjust Phase Shifter Quadrature (L98 on A52 Phase Shifter board)**
- a. Extend A52 and remove the jumper from P34 (labeled TEST and NORMAL) on A52. Connect the leveled sine wave generator output through a BNC-to-Square Pin adapter cable to pins 1 & 2 (TEST) of P34. Monitor the output of A52 with the test oscilloscope at pin 6 of the Extender board.

- b. Set the test oscilloscope time/div to 0.5 ms and use the leveled sine wave generator rectangle output for an external trigger. Set the leveled sine wave generator output level to 5 V p-p and frequency to 1 kHz.
- c. **ADJUST** L98 on A52 for minimum 1 kHz amplitude modulation of the A52 Phase Shifter output.
- d. Remove the BNC-to-Square Pin adapter cable from P34 and return the jumper to pins 2 & 3 (NORM).

8. **Adjust IF Atten/Amp Bias (R46 on A21 IF Atten/Amp Board, R76 on A24 and A25 IF SAW Amp boards, and R64 on A26 IF Post Amp board)**

- a. Connect and set the test equipment as shown in Fig. 4-40.
- b. Set both the rf signal generator rf output level and the leveled sine wave generator output level for -20 dBm signals on the spectrum analyzer.
- c. Connect the device-under-test port of the VSWR bridge through a BNC-to-Square Pin adapter cable to pins 11 (OUT NARROW) & 12 (GND) in the A20 shield. Remove A22 and connect pins 1 (IN NARROW) & 2 (GND) through a BNC-to-Square Pin adapter cable to the spectrum analyzer rf input.

**NOTE**

*Adjusting R46 may have little, if any, noticeable affect on intermodulation.*

- d. **ADJUST** R46 on A21 for minimum intermodulation at 26.5 MHz and 26.0 MHz.
9. **Adjust IF Filter (L22, L32, L45, L52, L62, C35, and C55 on A20 IF Filter-Amp board)**
- a. Connect and set the test equipment as shown in Fig. 4-41.



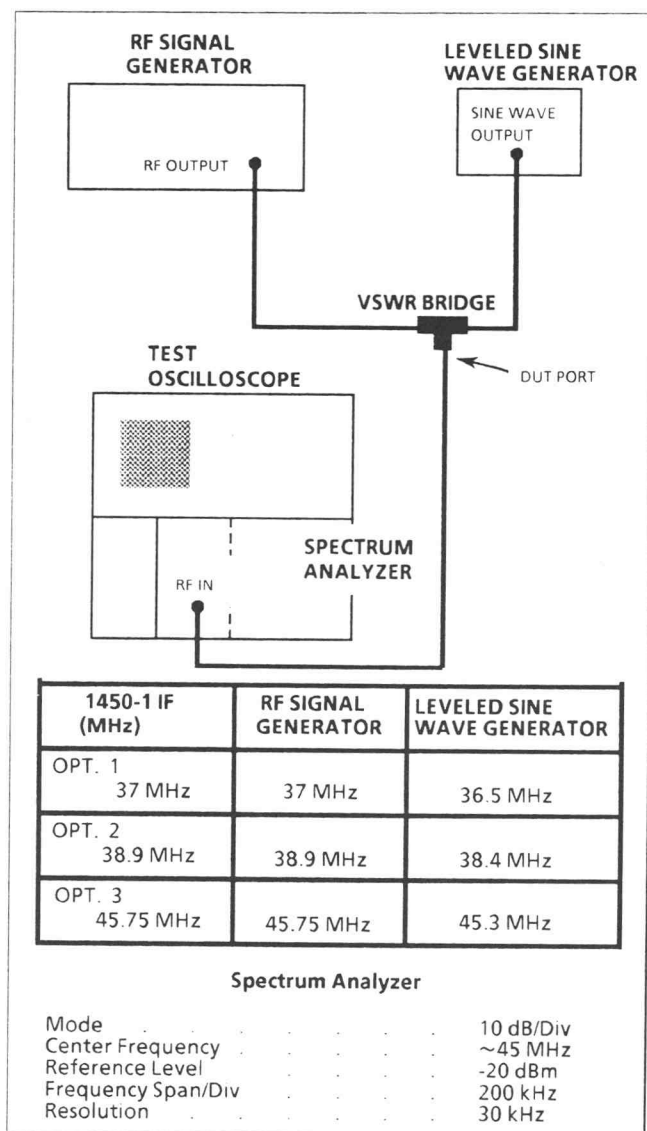


Fig. 4-40. Setup for adjusting bias.

- Set the spectrum analyzer reference level to +10 dBm. Use the spectrum analyzer manual scan and center frequency controls to precisely set the center frequency at the trap frequency according to the table in Fig. 4-41. Monitor the center frequency on the digital counter.
- Install A20 on an Extender board. Remove A22 and connect pins 1 (IN) & 2 (GND) in the A22 shield through a BNC-to-Square Pin adapter cable to the spectrum analyzer rf input. Set the spectrum analyzer time/div to 10 ms, the reference level to -20 dBm (Rf dB set to +10), and the mode to 2 dB/div.

- ADJUST L45 for a dip at the trap frequency. See Fig. 4-42 for a typical display.

**NOTE**

Parts e through i of this step describe the procedure for setting the 0.2 dB reference flatness. This reference will be used for adjusting both the A20 IF Filter and the A22 IF Mixer Filter.

When setting the center frequency or locating bandwidth limits, use the frequency counter for a precise frequency readout.

- Remove A20 and connect pins 1 (GND) & 2 (IN) in the A20 shield through a BNC-to-Square Pin adapter cable to the spectrum analyzer rf input. Set the spectrum analyzer reference level to 0 dBm, mode to 10 dB/div, and time/div to manual.
- Use the spectrum analyzer manual scan and center frequency controls to precisely set the center frequency, according to the table in Fig. 4-41. Then set the spectrum analyzer vertical mode to 2 dB/div and time/div to 10 ms and set the test oscilloscope vert mode to left. Use the differential amplifier offset control to position the trace on screen.
- Set the differential amplifier volts/div var control for a vertical deflection of 5 divisions as the tracking generator output level is switched between 0 dBm and 1 dBm, leaving the tracking generator output level set to 0 dBm when finished. This calibrates the display to 0.2 dB/division.

**NOTE**

Take care not to change the differential amplifier volts/div var control throughout the remainder of this step.

- Center the trace on screen and use a grease pencil to mark the trace on the graticule or implosion shield.
- Set the spectrum analyzer time/div back to manual and use the spectrum analyzer

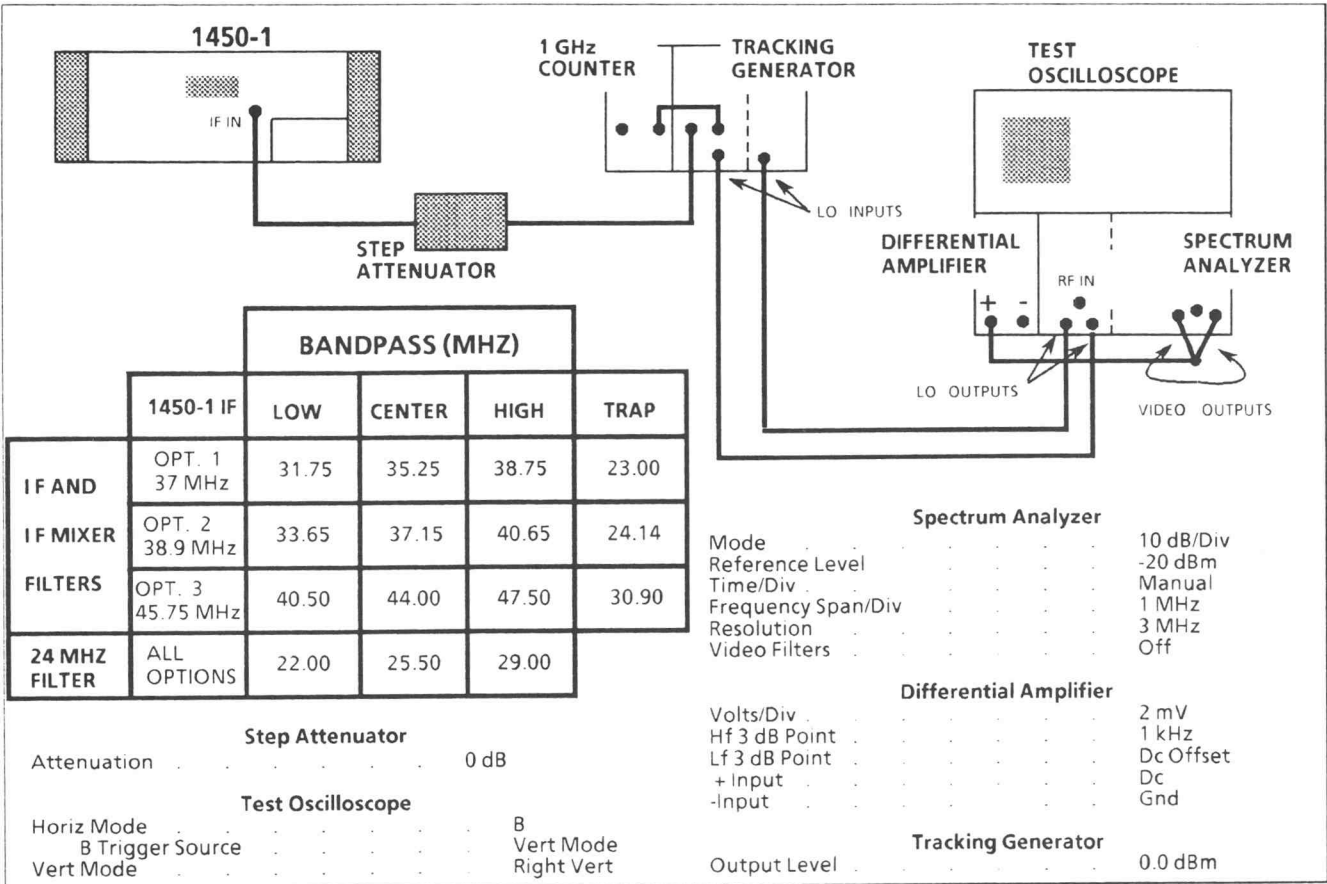


Fig. 4-41. Setup for adjusting IF, IF Mixer, and 24 MHz filters.

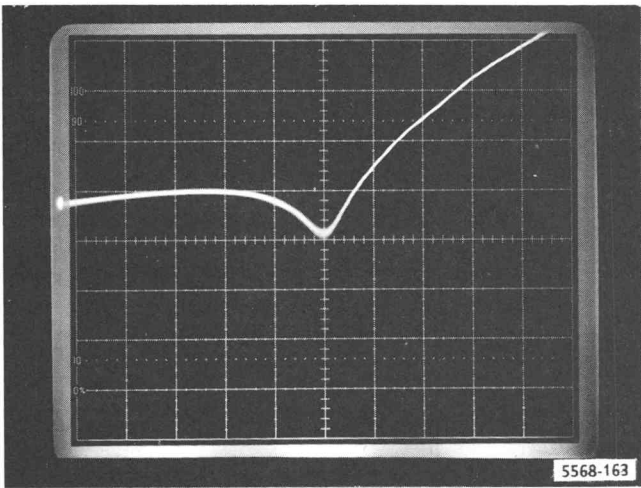


Fig. 4-42. IF filter trap waveform.

manual scan control to locate the bandwidth limits. Mark these limits with a grease pencil on the graticule or implosion shield. This grease pencil trace will be used as the flatness reference for adjusting the A20 IF Filter and the A22 IF Mixer Filter.

- j. Connect pins 1 (IN) & 2 (GND) in the A22 shield through a BNC-to-Square Pin adapter cable to the spectrum analyzer rf input. Install A20 on the Extender board and set the step attenuator to 20 dB. Use the differential amplifier offset control to position the trace on screen.
- k. **ADJUST** L22, L32, L52, L62, C35, and C55 on A20 for flatness within 0.1 dB of the grease pencil trace over the appropriate bandwidth.
- l. Install A20 into its shield and note the difference in filter response. Install A20, once again, on an Extender board.
- m. **ADJUST** L22, L32, L52, L62, C35, and C55 on A20 for flatness within 0.1 dB of the grease pencil trace over the appropriate bandwidth, compensating for the change in filter response while on the Extender board.

- n. Repeat parts l and m of this step until the IF Filter response is flat within 0.1 dB of the grease pencil trace when it is installed in its shield.
  - o. Install A20 and A22.
- 10. Adjust IF Mixer Filter (L33, L36, and C48 on A22)**
- a. Set up the 0.2 dB/div flatness reference. Refer to Fig. 4-41 and parts e through i of step 9.
  - b. Install A20 and remove A21 from the 1450-1. Connect the tracking generator output through the step attenuator and a BNC-to-Square Pin adapter cable to pins 5 (OUT) & 6 (GND) in the A21 shield. Set the step attenuator for 0 dB attenuation.
  - c. Install A22 on an Extender board and remove the jumper from P40. Connect pins 1 (GND) & 4 of P40 through a BNC-to-Square Pin adapter cable to the spectrum analyzer rf input. If necessary, use the differential amplifier offset control to position the trace on screen.
  - d. **ADJUST** L43, L36, and C48 on A22 for flatness within 0.1 dB of the grease pencil trace over the appropriate bandwidth. See the table in Fig. 4-41 for bandwidth limits.
  - e. Install A22 into its shield and note the difference in filter response. Install A22, once again, on an Extender board.
  - f. **ADJUST** L43, L36, and C48 on A22 for flatness within 0.1 dB of the grease pencil trace over the appropriate bandwidth, compensating for the change in filter response while on the Extender board.
  - g. Repeat parts d through f of this step until the IF Mixer Filter response is flat within 0.1 dB of the grease pencil trace when A22 is installed in its shield.
  - h. Return the jumper to pins 3 & 4 of P40 on A22 and install A21 and A22.
- 11. Adjust 24 MHz Bandpass Filter (L58, L54, L51, L61, C48, C44, and C41 on A23 IF Switch/Aural Drive board)**
- a. Set up the 0.2 dB flatness reference. Refer to Fig. 4-41 for bandwidth limits and perform parts b through e of step 9 with the following equipment connection exceptions. Then continue with part b of this step:
    - (1) Remove A22, A23, and A24 from their shields.
    - (2) Connect the tracking generator rf output through the step attenuator and a BNC-to-Square Pin adapter cable to pins 7 (GND) & 8 (OUT) in the A22 shield.
    - (3) Connect pins 7 (GND) & 8 (IN) in the A23 shield through a BNC-to-Square Pin adapter cable to the spectrum analyzer rf input.
  - b. Install A23 on the Extender board and connect pins 11 (IN) & 12 (GND) in the A24 shield through a BNC-to-Square Pin adapter cable to the spectrum analyzer rf input. Use the differential amplifier offset control to position the trace on screen.
  - c. **ADJUST** L58, L54, L51, L61, C48, C44, and C41 on A23 for flatness within 0.1 dB of the grease pencil trace over the appropriate bandwidth.
  - d. Install A23 into its shield and note the difference in filter response. Install A23, once again, on an Extender board.
  - e. **ADJUST** L58, L54, L51, L61, C48, C44, and C41 on A23 for flatness within 0.1 dB of the grease pencil trace over the appropriate bandwidth, compensating for the change in filter response while on the Extender board.
  - f. Repeat parts d and e of this step until the 24 MHz Bandpass Filter response is flat within 0.1 dB of the grease pencil trace when it is installed in its shield.
  - g. Install A22, A23, and A24.



12. Adjust Video Detector and Quadrature Detector Low Pass Filters (L44, L54, and L64 on A29 and A28 Det-Video Amp boards)

- Connect and set the test equipment as shown in Fig. 4-43.
- Connect the tracking generator rf output through a low pass filter (see Fig. 4-6 for construction details) to pins 3 (GND) through 6 in the A27 shield.
- Use the spectrum analyzer center frequency control to display the 29 MHz pulse on the right half of the crt, then set the test oscilloscope vertical mode to left vert.
- Set the tracking generator output level for a 2 V p-p display at the center of the envelope. Use the differential comparator offset control as necessary to display the envelope. See Fig. 4-44.
- Connect the 1450-1 VIDEO OUTPUT through a P-P Detector Head to the P-P Detector Amplifier. Connect the P-P Detector Amplifier Output to the

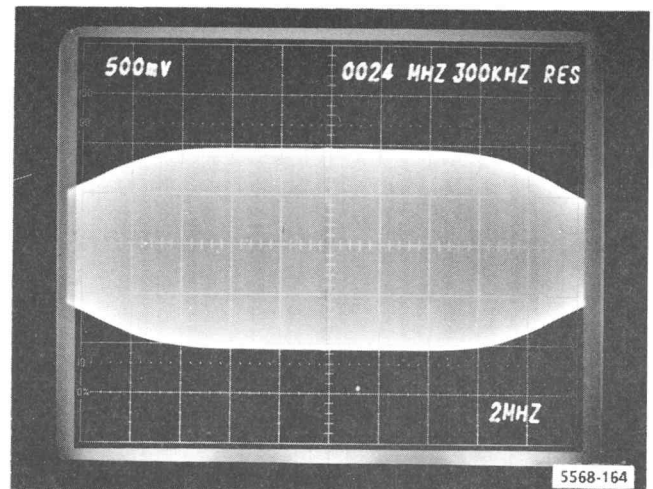


Fig. 4-44. Preliminary waveform when adjusting low pass filters.

differential comparator + Input, and set the differential comparator volts/div to 10 mV.

- ADJUST** L44, L54, and L64 for flat response within 10 mV between the zero-beat (center of envelope at 24 MHz) and the 29 MHz marker. This will also adjust the left half of the waveform for flat response within 10 mV between 19 MHz and the zero-beat. A small amount of tilt in the waveform is typical. See Fig. 4-45.

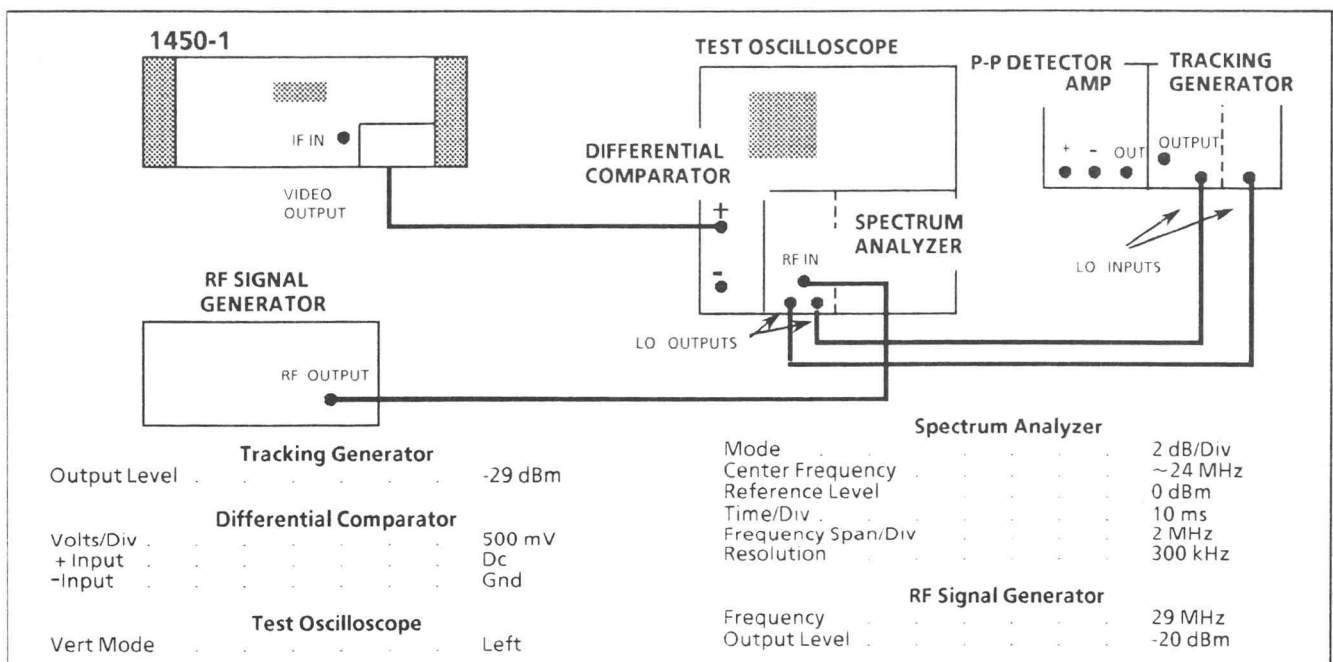


Fig. 4-43. Setup for adjusting low pass filters.

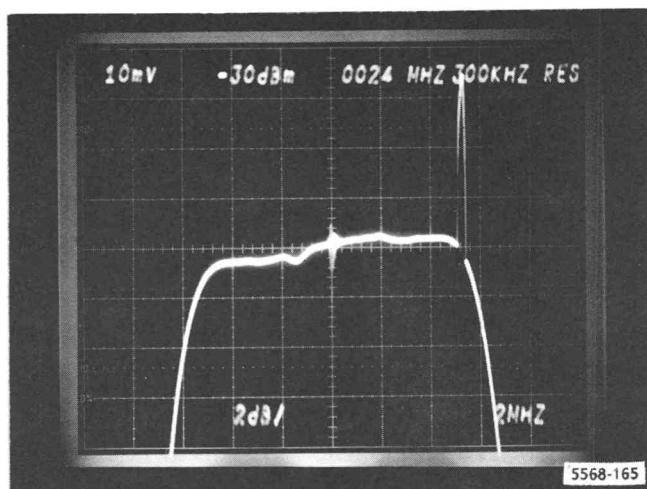


Fig. 4-45. Typical display when adjusting low pass filters.

**NOTE**

*A28 Quadrature Detector Low Pass Filter should be adjusted in the A29 shield. This allows A28 to replace A29, should A29 fail.*

*The two boards (A28 and A29) are identical. The basic board becomes a video detector when the jumper on P71 is on pins 2 & 3, and a quadrature detector when the jumper on P71 is on pins 1 & 2.*

- g. Remove A28 and A29. Install A28, with the jumper on P71 on pins 2 & 3, in the A29 shield. Install A29, with the jumper on P71 on pins 1 & 2, in the A28 shield.
- h. **ADJUST** L44, L54, and L64 on A28 (in the A29 shield) for flat response within 10 mV between the zero-beat (center of envelope at 24 MHz) and the 29 MHz marker. This will also adjust the left half of the waveform for flat response within 10 mV between 19 MHz and the zero-beat. A small amount of tilt in the waveform is typical.
- i. Remove A28 and A29. Return the jumpers on P71 on both boards to their original positions and install them in their appropriate shields.

### 13. Adjust Video Detector and Quadrature Detector Balance (R11 on A29 and A28 Det-Video Amp boards)

- a. Connect and set the test equipment as shown in Fig. 4-46.

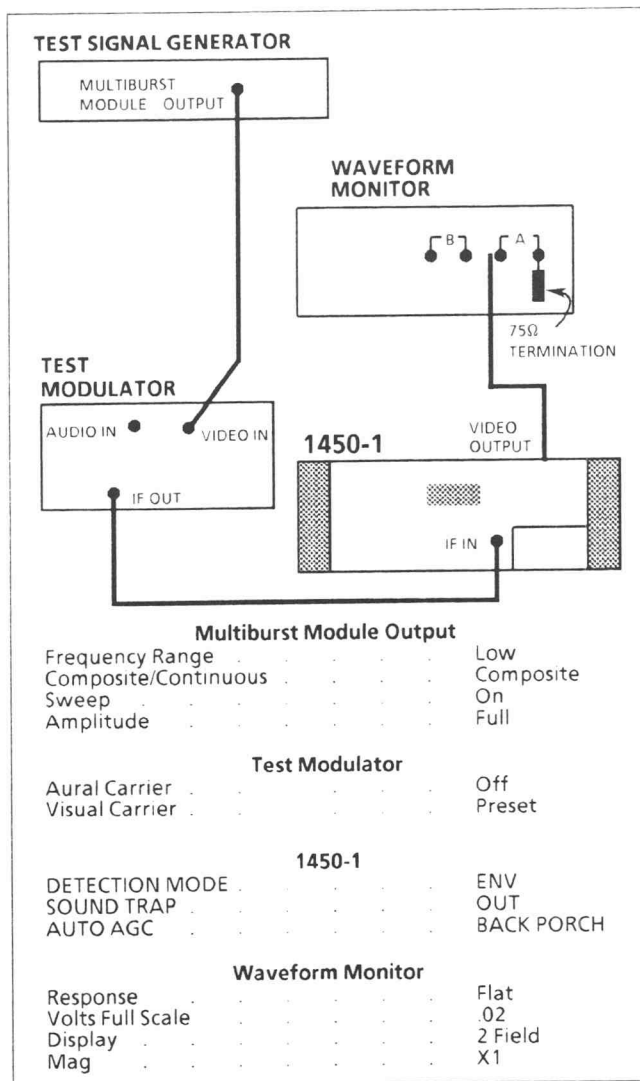


Fig. 4-46. Setup for adjusting detector balance.

- b. Use the waveform monitor position controls to display the top of the waveform. See Fig. 4-47a.
- c. **ADJUST** R11 on A29 for minimum distortion on the top of the sweep waveform. See Fig. 4-47b.

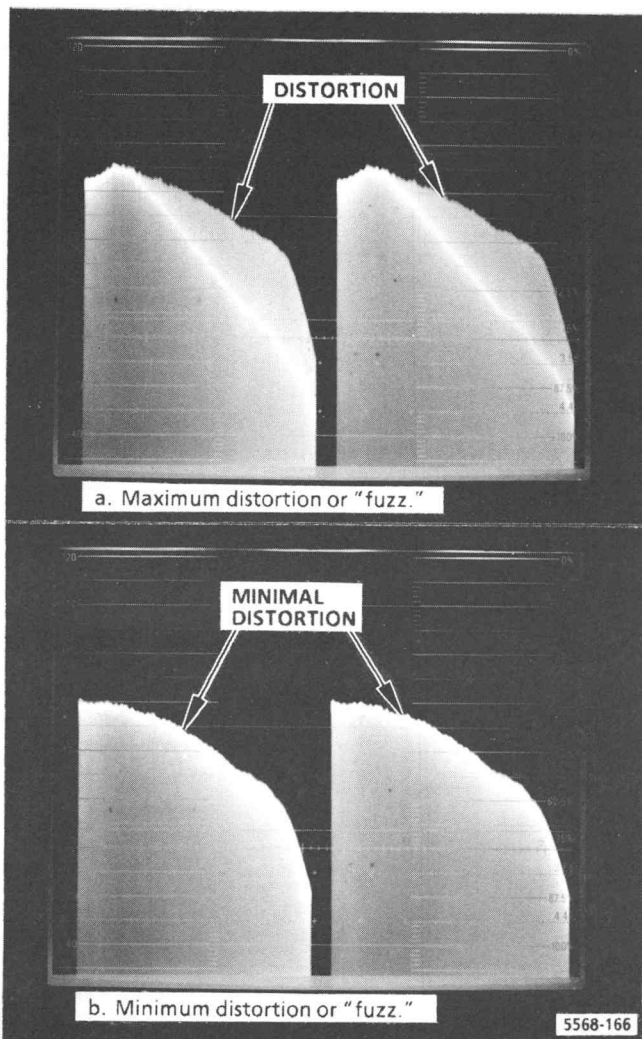


Fig. 4-47. Typical displays when adjusting detector balance.

- d. Remove A28 and A29. Install A28, with the jumper on P71 on pins 1 & 2, in the A29 shield. Install A29, with the jumper on P71 on pins 2 & 3, in the A28 shield.
- e. **ADJUST** R11 on A28, in the A29 shield, for minimum distortion on the top of the sweep waveform. See Fig. 4-47b.
- f. Remove A28 and A29. Return the jumpers on P71 on both boards to their original positions, and install them in their appropriate shields.

#### 14. Adjust IF Mixer Balance (C63 and R51 on A22)

- a. Connect and set the test equipment as shown in Fig. 4-48.
- b. Set the rf signal generator output level so the  $\sim 2$  MHz signal is at 0 dBm, then set the rf signal generator frequency to 27 MHz.
- c. **ADJUST** C63 and R51 for minimum intermediate frequency feed-through at  $\sim 3$  MHz. If no signal is present at  $\sim 3$  MHz, increase the leveled sine wave generator output level until a signal is visible, and then adjust C63 and R51. See Fig. 4-49.

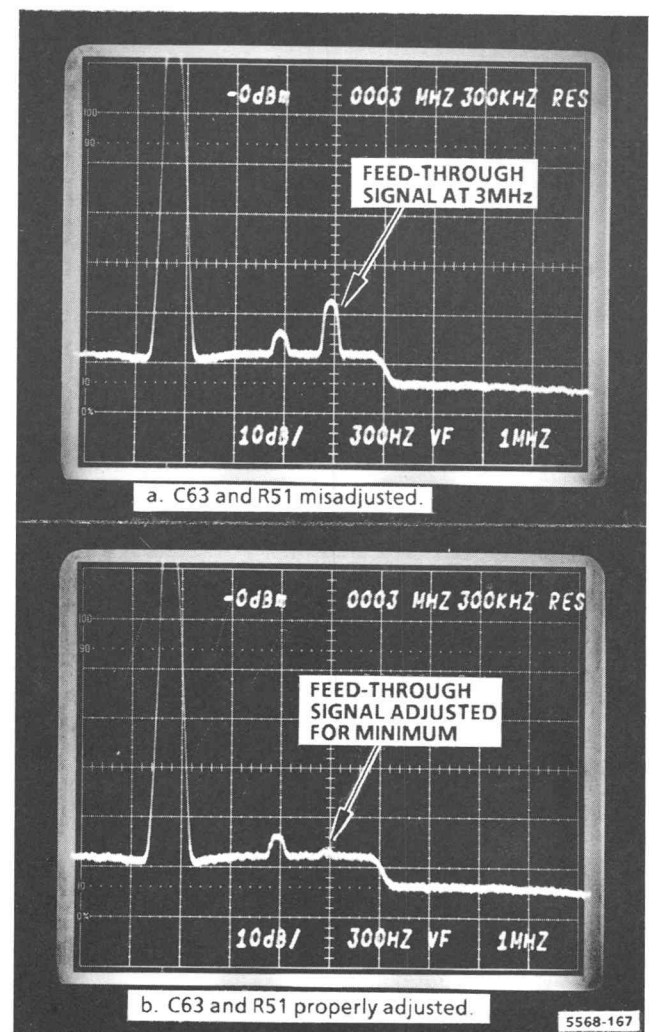


Fig. 4-49. Typical displays when adjusting IF mixer balance.

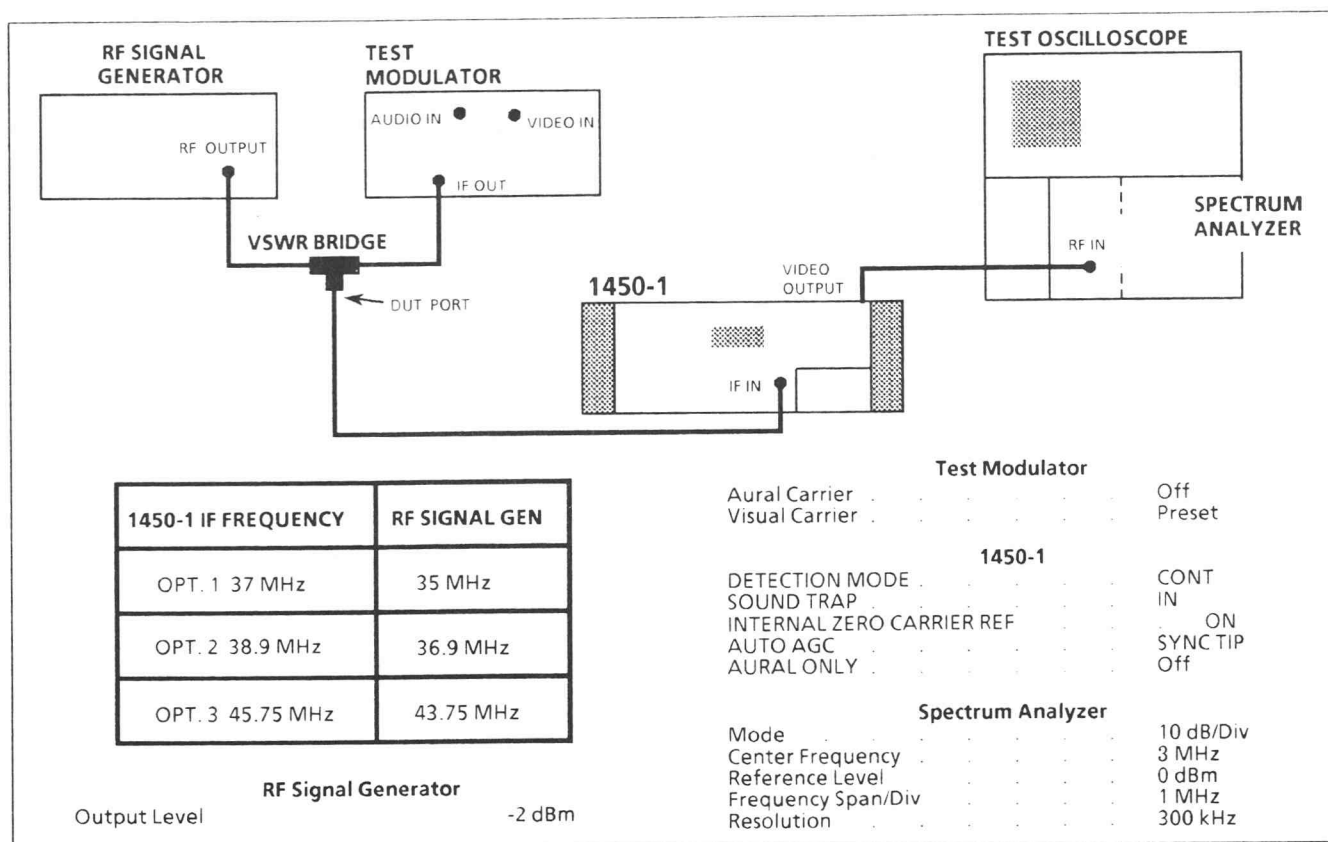


Fig. 4-48. Setup for adjusting IF mixer balance.

**15. Adjust Video-to-Quadrature Phase (L48, C10, and L13 on A27 IF Zero Carrier/Phase Shifter board)**

- Connect and set the test equipment as shown in Fig. 4-50.
- Remove the jumper from P34 on A52. Connect the wiper arm of R1000 (see Fig. 4-5 for construction details) to pin 2 of P34 on A52.
- Set the 1450-1 GAIN control so that both Level LEDs on the RF SIGNAL INPUT LEVEL readout are off.
- ADJUST** C10 to its electrical midrange, observing the swing of phase display on the waveform monitor. See Fig. 4-51.
- Set R1000 for maximum H-sync amplitude as observed on the test oscilloscope.
- ADJUST** L48 for maximum H-sync amplitude as observed on the test oscilloscope.
- ADJUST** L13 for a vertical phase display on the waveform monitor. See Fig. 4-51. Note that L21 and L25 on A27 do not have adjustable cores.
- Repeat parts e through g of this step until no further improvement is noted.
- If proceeding to the next step, simply remove R1000 and return the jumper to pins 2 & 3 (NORM) of P34 on A52. If not, disconnect the test equipment from the 1450-1, remove R1000, and return the jumper to pins 2 & 3 of P34 on A52.

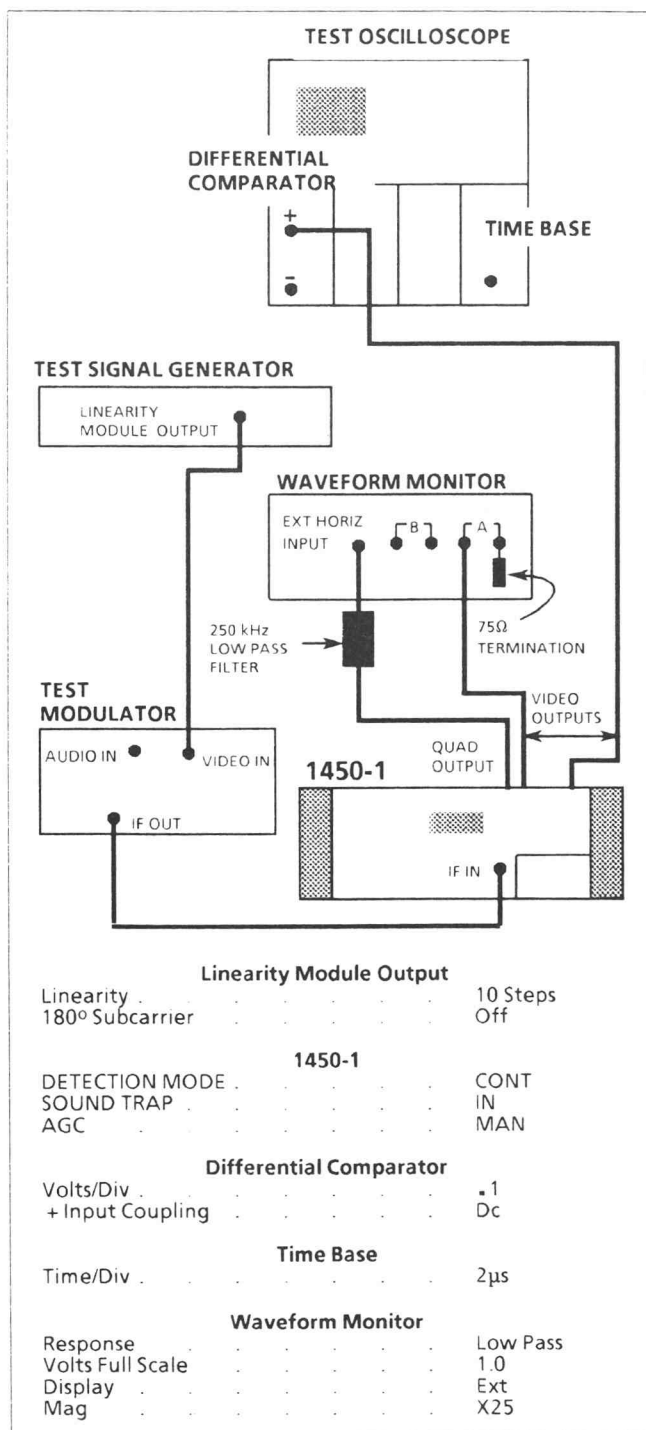


Fig. 4-50. Setup for adjusting video-to-quadrature phase.

#### 16. Adjust Quadrature DC Level (R60 on A28 Quadrature Detector board)

- Connect and set the test equipment as shown in Fig. 4-50 with the following exceptions:

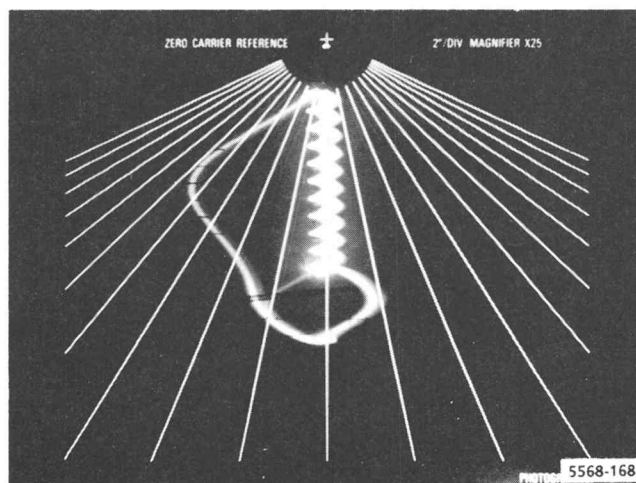


Fig. 4-51. Vertical phase display.

- Do not connect R1000 to the 1450-1.
  - Set the 1450-1 DETECTION MODE to CONT and AGC to BACK PORCH.
- ADJUST R60 on A28 for a vertical phase display. See Fig. 4-51.
- #### 17. Adjust Phase Sampler Balance (C01 on A52 Phase Shifter board)
- Connect and set the test equipment as shown in Fig. 4-50 with the following exceptions:
    - Set the 1450-1 DETECTION MODE to CONT and AGC to BACK PORCH.
  - ADJUST C01 on A52 for no phase shift of the phase display as the 1450-1 SYNCHRONOUS TIME CONSTANT is switched between FAST and SLOW, and as the 1450-1 DETECTION MODE is switched between BACK PORCH and SYNC TIP.
- #### 18. Adjust Quadrature Carrier Phase (C10 on A27 IF Zero Carrier/Phase Shifter board)

- Connect and set the test equipment as shown in Fig. 4-52.
- Use the waveform monitor position controls to display the bottom of the 2T pulse.

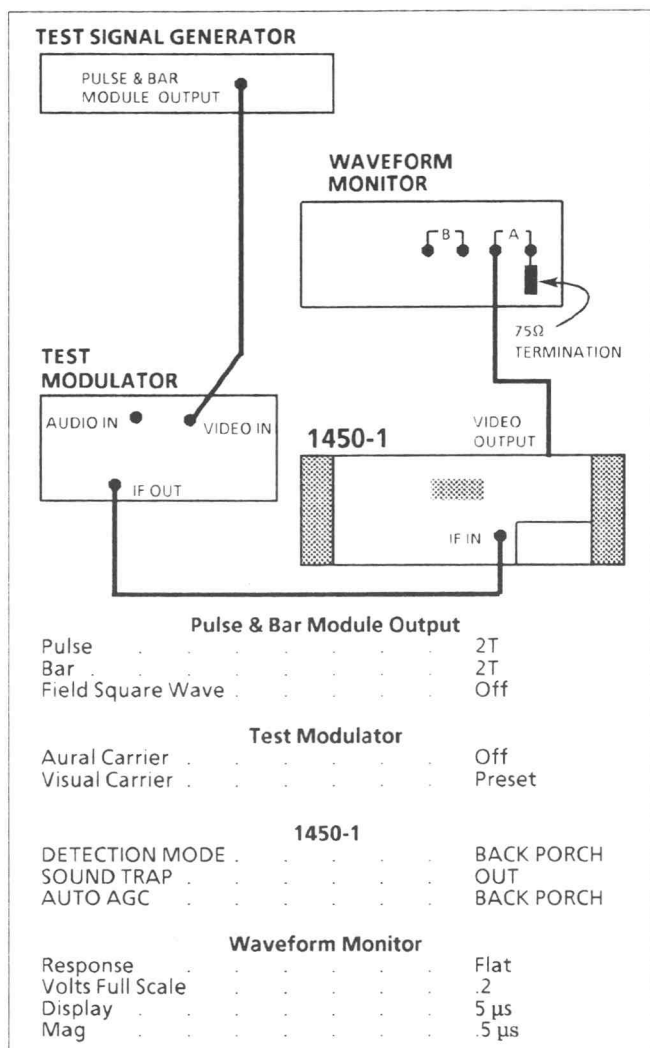


Fig. 4-52. Setup for adjusting quadrature carrier phase.

- c. **ADJUST** C10 on A27 for equal overshoot and undershoot on the trailing edge of the 2T pulse.

**19. Adjust Limiter (R00, R30, and R50 on A55 Limiter board)**

- a. Connect and set the test equipment as shown in Fig. 4-50 with the following exceptions:
- (1) Connect the test modulator IF Out through a 10X attenuator to the 1450-1 IF IN.
  - (2) Set the 1450-1 DETECTION MODE to ENVELOPE.
- b. Center the adjustable core in L98 on A27.

- c. **ADJUST** R00, R30, and R50 for a phase display that remains within 2° of vertical as the GAIN control is varied between normal gain (Level LEDs off) and minimum signal amplitudes.

**NOTE**

If R00, R30, and R50 do not have sufficient range to set the phase display within 2° of vertical, remove R04 on A55 and replace it with a 500Ω pot set at ~200Ω. Then adjust R00, R04, R30, and R50.

After the proper adjustment has been made, remove R04 (500Ω pot), measure its resistance, and replace it with a 1% resistor nearest that measured value.

**20. Adjust IF Delay (L98 on A27 IF Zero Carrier/Phase Shifter board)**

- a. Connect and set the test equipment as shown in Fig. 4-50 (same as previous step).

**NOTE**

If the cover has been removed from the A55 shield, which would cool A55 slightly, L98 on A27 will need to be adjusted to compensate for the temperature shift as A55 warms up.

- b. **ADJUST** L98 on A27:

If A55 has cooled, for a phase display ~6° to left of vertical when A27 is extended. This should yield a phase display of between 1° and 2° to the left of vertical when A27 is in its shield. Repeat this step as necessary.

If A55 has not cooled, for a vertical phase display within 1° of vertical when A27 is installed in the shield. Repeat this step as necessary.

**21. Adjust Temperature Tracking Balance (R60 and R70 on A50 Reference Control board)**

- a. Install A50 on the Extender board and center R60.
- b. Record the voltage at pin 11 of the Extender board with the DVM.



- c. Monitor pin 7 of U56 on A50 with the DVM.
- d. **ADJUST** R70 for the voltage recorded in part 2 of this step at pin 7 of U56.

**22. Adjust Narrow Band and Wide Band Linearity (R40 and R50 on A50 Reference Control board)**

- a. Connect and set the test equipment as shown in Fig. 4-53.
- b. **ADJUST** R50 on A50 so the p-p detected field sweep display is as linear as possible. See Fig. 4-54 for comparative waveforms. Some tilt may be present after adjustment. This tilt will be adjusted out in the next step.
- c. Set the 1450-1 SOUND TRAP to OUT and reset the GAIN control so both Level LEDs are off.
- d. **ADJUST** R40 on A50 so the p-p detected field sweep display is as linear as possible. See Fig. 4-54b for comparative waveforms.

**23. Adjust Overall Flatness (C70 on A26 IF Post Amp board)**

- a. Connect and set the test equipment as shown in Fig. 4-53 (same as previous step).
- b. **ADJUST** C70 on A26 for the flattest response of the p-p detected waveform within 3% (21 mV).

**24. Adjust Switch Current Balance (R72 on A27 IF Zero Carrier/Phase Shifter board)**

- a. Connect and set the test equipment as shown in Fig. 4-55.
- b. **ADJUST** R72 for no overshoot or undershoot on the top of the leading edge of the zero carrier pulse. A small amount of ringing is normal.

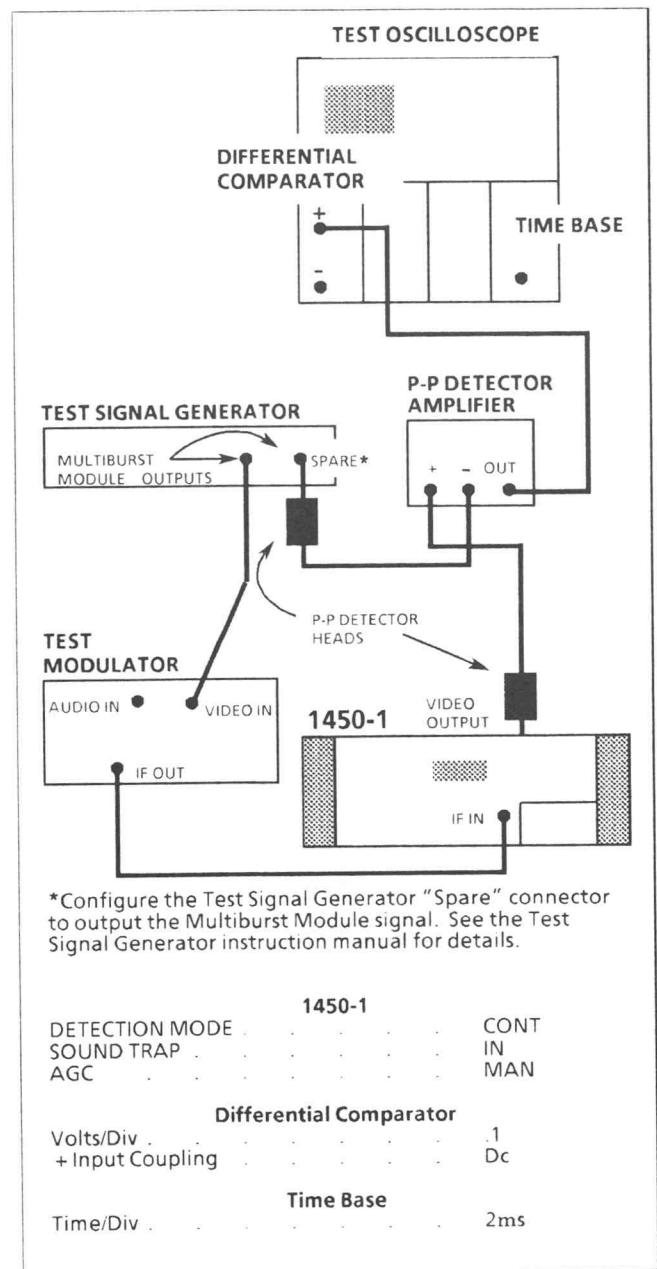
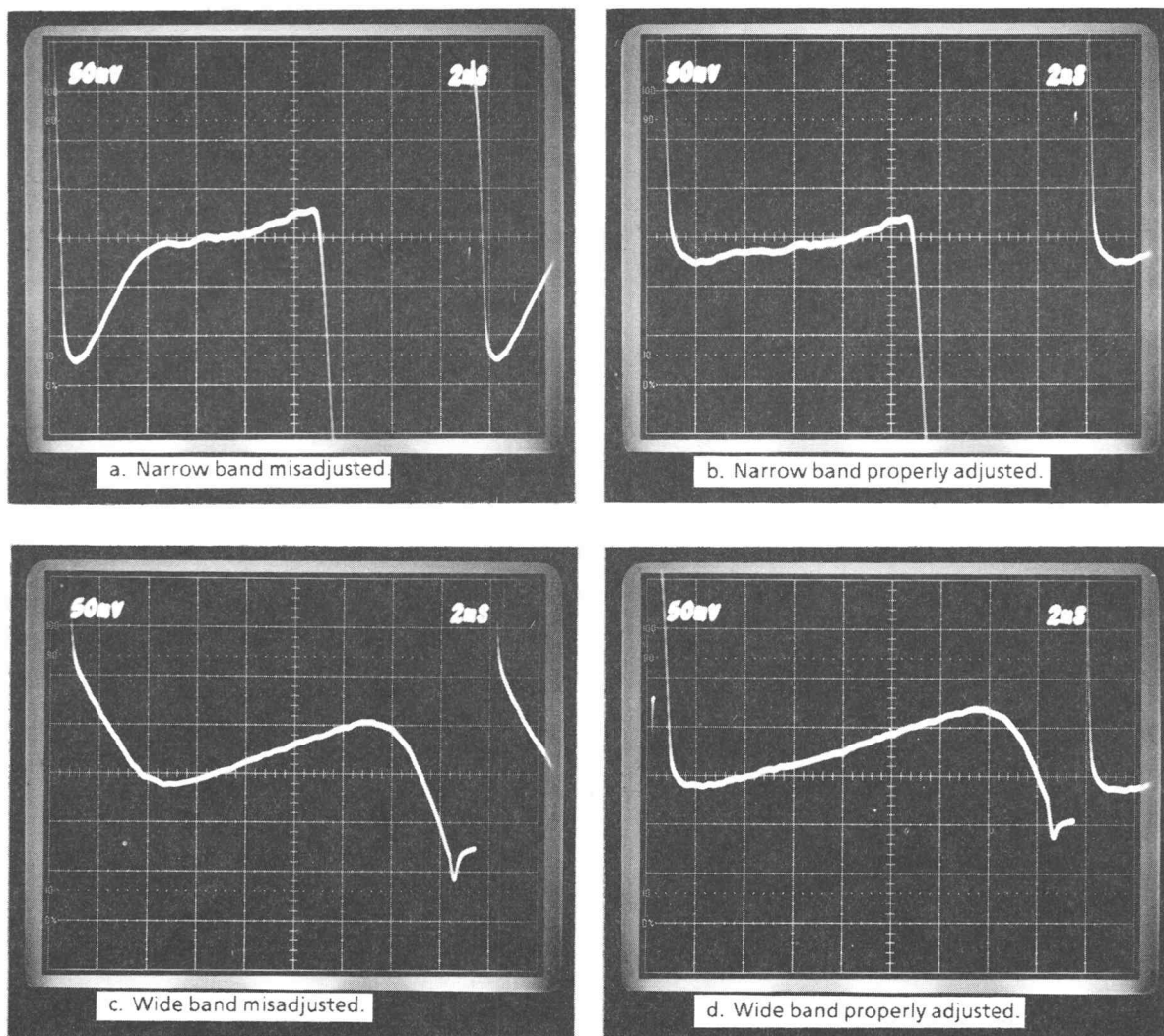


Fig. 4-53. Setup for adjusting linearity and flatness.

**25. Fine Adjust AGC (R47 on A60 AGC Control board)**

- a. Connect and set the test equipment as shown in Fig. 4-55 with the following exceptions:
  - (1) Set the 1450-1 AGC to MAN and set the GAIN control so the Level LEDs are off.



5568-169

Fig. 4-54. Typical displays when adjusting narrow and wide band linearity.

- (2) Set the waveform monitor Volts full scale control to 1.0, display to 5  $\mu$ s, and magnifier to X1.

**NOTE**

*R47 on A60 is accessed through a hole in A61. This hole is located between U85 and U88 on A61.*

- b. **ADJUST** R47 for minimum jumps in the displayed blanking level while changing the 1450-1 GAIN control setting. First adjust R47 while increasing the 1450-1 GAIN, and then check that the adjustment is still correct while reducing the 1450-1 GAIN.



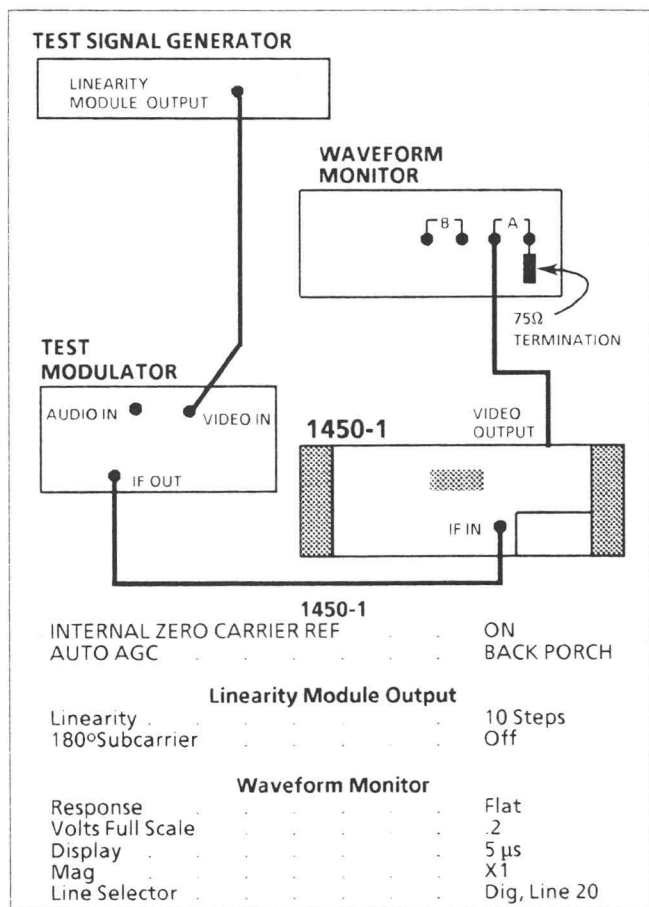


Fig. 4-55. Setup for adjusting switch current balance.

## 26. Adjust Video Amp DC Level (R60 on A29 Det-Video Amp board)

- Connect and set the test equipment as shown in Fig. 4-56.
- Use the waveform monitor position controls to display the blanking level. Identify the zero carrier pulse by switching the 1450-1 INTERNAL ZERO CARRIER REF between OFF and ON.
- ADJUST** R60 so the zero carrier pulse matches the blanking level.

## 27. Adjust Sync Tip Level (R17 on A60 AGC Control board)

- Connect and set the test equipment as shown in Fig. 4-56 with the following exceptions:

- (1) Set the 1450-1 AGC to SYNC TIP.

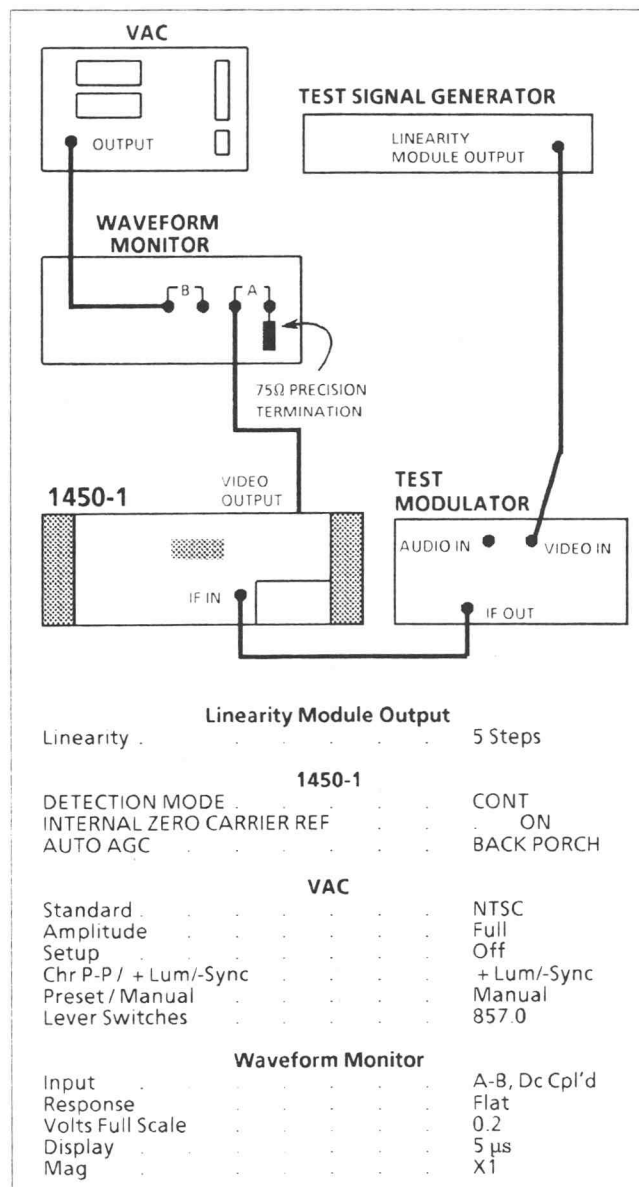


Fig. 4-56. Setup for adjusting video levels.

- (2) Set the VAC amplitude to B43.0 and + Lum/-Sync to -Sync.

### NOTE

To set the VAC amplitude readout to B43.0, select Pal, Preset, and CB Q. This will give a readout of FFF.F. Then use the Variable control to decrease the output to B43.0. B43.0 corresponds to 1143.0 mV.

R47 on A60 is accessed through a hole in A61. This hole is located between U32 and U35 on A61.

- b. **ADJUST** R17 on A60 so the zero carrier pulse matches the sync tip level.

**28. Adjust IF Atten/Amp Gain (R51 on A21 IF Atten/Amp board)**

- a. Connect the rf signal generator rf output to the power meter. Set the rf signal generator frequency to 3 MHz below the 1450-1 IF frequency and set the output level for a reading of -20 dBm on the power meter. Then connect the rf signal generator rf output to the 1450-1 IF INPUT.
- b. Set the 1450-1 SOUND TRAP to IN and AGC to MAN, with the GAIN control fully counterclockwise.
- c. Remove A24 and connect pins 11 (IN NARROW) & 12 (GND) in the A24 shield through a BNC-to-Square Pin adapter cable to the power meter.
- d. **ADJUST** R51 on A21 for a -20 dBm reading on the power meter (0 dB gain from IF INPUT to A24 input). If R51 lacks sufficient range to get a -20 dBm reading, set R51 for a level of at least -22 dBm.
- e. Install A24.

**29. Adjust Narrow IF SAW Amp Gain (R93 on A24 IF SAW Amp board)**

**NOTE**

*Omit parts a and b of this step if continuing from step 28.*

- a. Set the 1450-1 SOUND TRAP to IN and AGC to MAN, with the GAIN control fully counterclockwise.
- b. Connect the rf signal generator rf output to the power meter. Set the rf signal generator frequency to 3 MHz below the 1450-1 IF frequency and set the output level for a reading of -20 dBm on the power meter. Then connect the rf signal generator rf output to the 1450-1 IF INPUT.
- c. Remove A26 and connect pins 3 (GND) & 4 (IN NARROW) in the A26 shield through a

BNC-to-Square Pin adapter cable to the power meter.

- d. **ADJUST** R93 on A24 for a -20 dBm reading on the power meter (0 dB gain from IF INPUT to A26 input).

- e. Install A26.

**30. Adjust IF Post Amp Gain (R41 on A26 IF Post Amp board)**

- a. Connect the rf signal generator rf output to the power meter. Set the rf signal generator frequency to the 1450-1 IF frequency and set the output level to -25 dBm on the power meter. Then connect the rf signal generator rf output to the 1450-1 IF INPUT.
- b. Set the 1450-1 DETECTION MODE to CONT, SOUND TRAP to IN, and AGC to SYNC TIP.
- c. **ADJUST** R41 for a 1450-1 RF SIGNAL INPUT LEVEL reading of -29.7 dBm.

**31. Adjust Wide IF SAW Amp Gain (R93 on A25 IF SAW Amp board)**

**NOTE**

*Omit part a of this step if continuing from step 30.*

- a. Connect the rf signal generator rf output to the power meter. Set the rf signal generator frequency to the 1450-1 IF frequency and set the output level to -25 dBm on the power meter. Then connect the rf signal generator rf output to the 1450-1 IF INPUT.
- b. Set the 1450-1 DETECTION MODE to CONT, SOUND TRAP to OUT, and AGC to SYNC TIP.
- c. **ADJUST** R93 for a 1450-1 RF SIGNAL INPUT LEVEL reading of -29.7 dBm.

**NOTE**

*Because flatness and gain are interactive, flatness needs to be readjusted after the gains have been set.*

### 32. Adjust Overall Flatness (C70 on A26 IF Post Amp board)

- Connect and set the test equipment as shown in Fig. 4-53.
- ADJUST** C70 on A26 for the flattest response of the p-p detected waveform within 3% (21 mV).

### 33. Adjust Q-P Filter (L70, L50, L30, and L01 on A45 Q-P Filter board)

- Connect and set the test equipment as shown in Fig. 4-57.

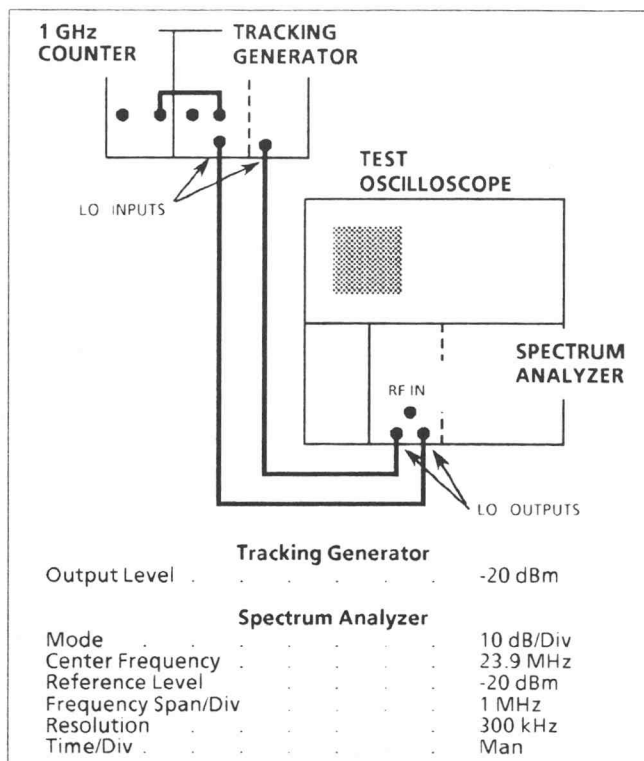


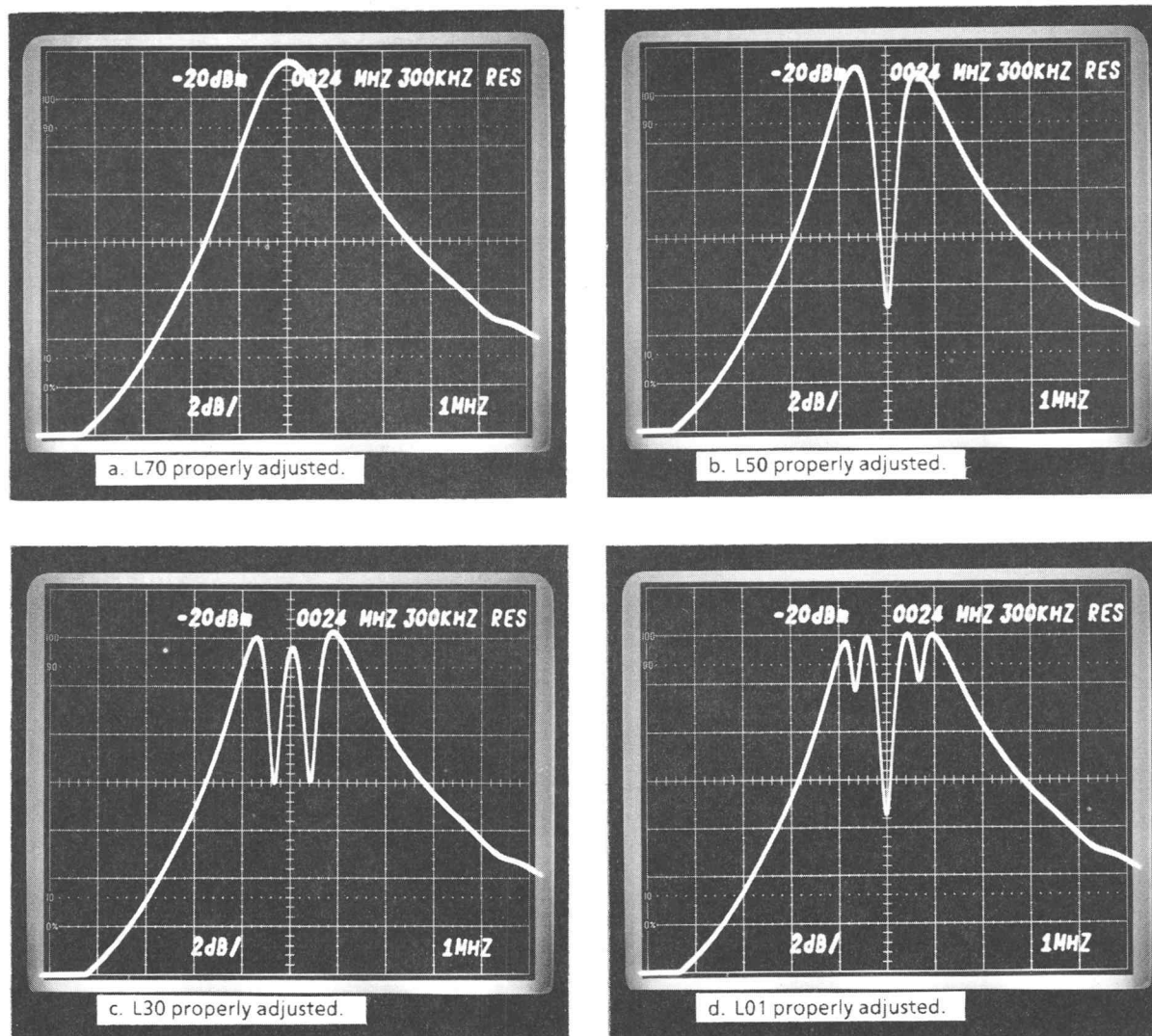
Fig. 4-57. Setup for adjusting Q-P filter.

- Use the spectrum analyzer manual and center frequency controls to precisely set the center frequency to 23.9 MHz, as monitored on the digital counter. Then set the spectrum analyzer time/div control to 5 ms.

- Connect the tracking generator rf output through a BNC-to-Peltola adapter cable to P95 on A44. Connect J92 on A45 through a BNC-to-Square Pin adapter cable to the spectrum analyzer rf input. Move the shorting jumper from J09 on A45 (storage pins) to J45 on A45.
- ADJUST** L70 for a peak at 23.9 MHz. See Fig. 4-58a.
- Move the shorting jumper to J24.
- ADJUST** L50 for a dip at 23.9 MHz. See Fig. 4-58b.
- Move the shorting jumper to J04.
- ADJUST** L30 for a peak at 23.9 MHz. The outer two peaks of this waveform should be approximately level. See Fig. 4-58c.
- Move the shorting jumper to J06.
- ADJUST** L01 for a dip at 23.9 MHz. The outer two dips of this waveform should be approximately level. See Fig. 4-58d.
- Return the shorting jumper to J09. Remove A46 and connect pins 5 (IN) & 6 (GND) through a BNC-to-Square Pin adapter cable to the spectrum analyzer rf input.
- CHECK** that the Q-P filter response is flat  $\pm 1$  dB from 23.6 MHz to 24.2 MHz, and is at least 25 dB down at 22.4 MHz.

### 34. Adjust 4.5 MHz Input and Output Bandpass Filters (T17 and T31 on A41 2<sup>nd</sup> Audio Mixer board)

- Set the tracking generator output to -40 dBm and connect it to the 1450-1 INTERCARRIER IN. Connect the 1450-1 INTERCARRIER OUT to the audio spectrum analyzer.



5568-170

Fig. 4-58. Typical displays when adjusting Q-P filter.

- b. Set the 1450-1 AUDIO SOURCE to External (SPLIT and INTER push buttons depressed). Set the spectrum analyzer controls as follows:

Center Frequency	4.5 MHz
Mode	2 dB/div
Reference Level	0 dB
Freq Span/Div	100 kHz
Resolution	30 kHz

- c. **ADJUST** T17 and T31 on A41 for the most linear display within 1.5 dB between 4.3 MHz and 4.7 MHz. See Fig. 4-59.

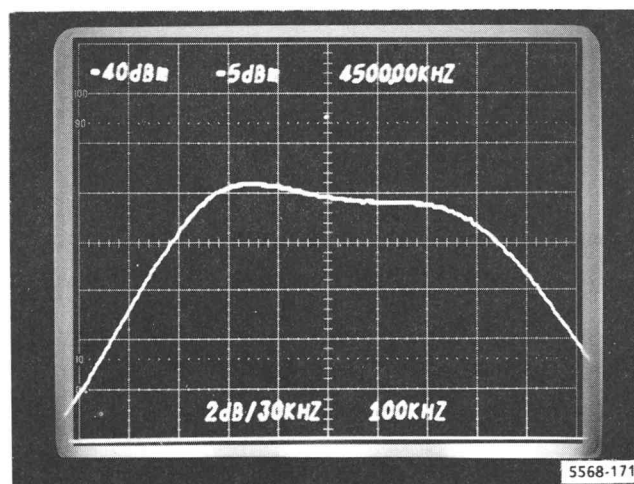


Fig. 4-59. 4.5 MHz bandpass filter

35. Adjust 28.5 MHz and Aural Alarm Bandpass Filters (L62, L66, and L92 on A40 1<sup>st</sup> Audio Mixer board)

### NOTE

Parts a and b of the step set the first carrier null.

- a. Connect and set the test equipment as shown in Fig. 4-60.

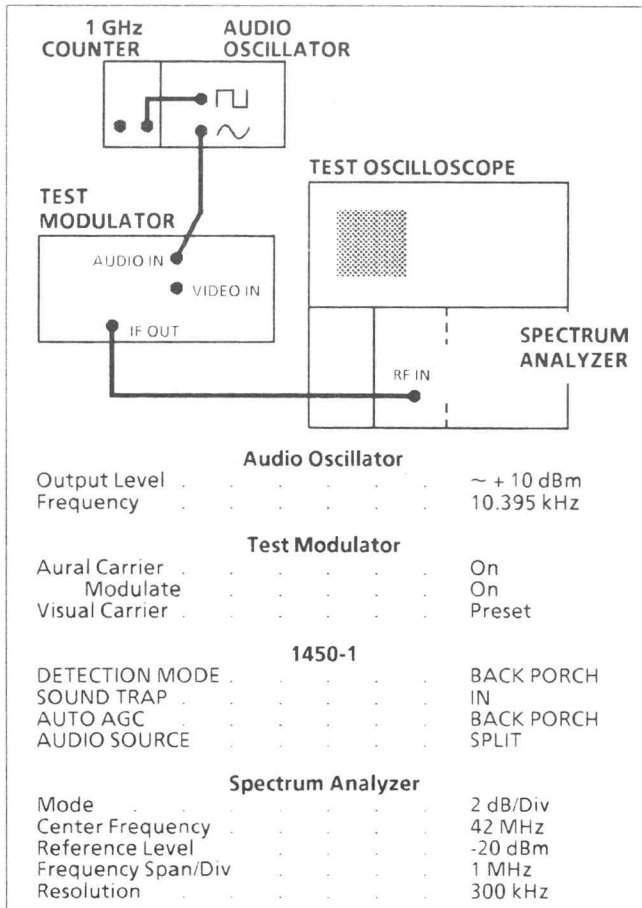


Fig. 4-60. Setup for obtaining 25 kHz deviation.

- b. Set the Test Modulator Aural Carrier Level control so the aural carrier level is 4 dB below the unmodulated visual carrier. See Fig. 4-61. Then reset the spectrum analyzer vertical mode to 10 dB/div, freq span/div to 10 kHz, and resolution to 3 kHz. Ensure the aural carrier is centered on the display. Set the oscillator Var Attenuator for the first carrier null at the center frequency. This sets the Test Modulator IF Out for 25 kHz deviation. See Fig. 4-62.

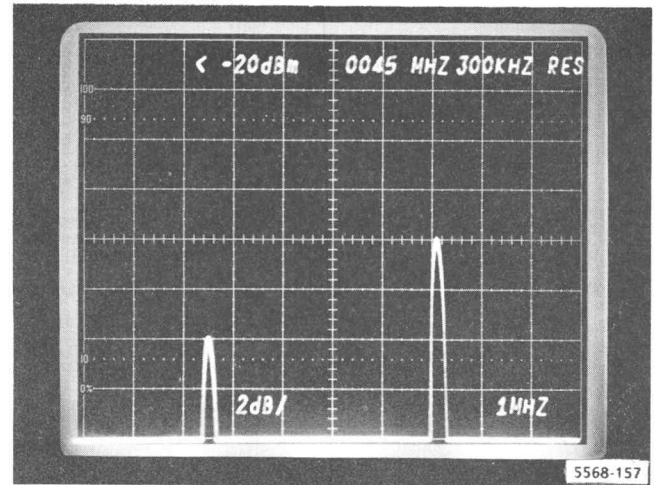


Fig. 4-61. Aural carrier 4 dB below unmodulated visual carrier.

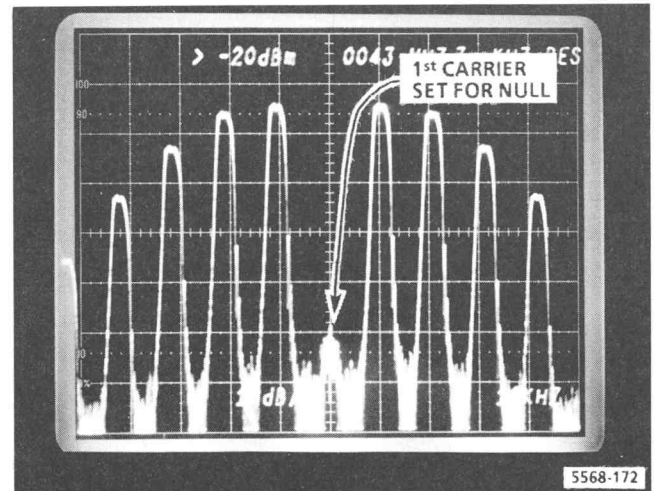


Fig. 4-62. 1<sup>st</sup> carrier null (25 kHz deviation).

- c. Connect the Test Modulator IF Out to the 1450-1 IF IN, and connect the 1450-1 INTERCARRIER OUT to the digital counter. Set the Test Modulator Aural IF Center Frequency so the INTERCARRIER OUT frequency is 4.5 MHz. Then monitor the INTERCARRIER OUTPUT with the test oscilloscope.
- d. **ADJUST** L62 and L66 on A40 for maximum INTERCARRIER OUT amplitude.

- e. Monitor pin 12 on the Extender board in the A40 shield with the test oscilloscope. Set the test oscilloscope vertical amplifier coupling to dc. Decrease the Test Modulator Aural Carrier Level until the 1450-1 AURAL CARRIER LOSS LED turns on. Then slowly increase the Aural Carrier Level until the AURAL CARRIER LOSS LED just turns off.
- f. **ADJUST** L92 for a maximum dc level at pin 12 of the Extender board.

**36. Adjust Output Amp Bias (R58 on A44 Audio Interface board)**

- a. Remove A43 and connect the audio oscillator output through a BNC-to-Square Pin adapter cable to pins 11 (GND) & 12 in the A43 shield. Set the 1450-1 DE-EMPHASIS to OUT, and set the oscillator to 5 V p-p at 10 kHz, as monitored at TP29 on A44 with the test oscilloscope.

- b. Connect the 1450-1 8 $\Omega$  SPEAKER output through the 8 $\Omega$  to 600 $\Omega$  matching coupler, with the 30 dB attenuator switched in, to the audio spectrum analyzer rf input. Set the audio spectrum analyzer controls as follows:

Mode	10 dB/div
Center Frequency	30 kHz
Freq Span/Div	5 kHz
Resolution	Coupled
Reference Level	-10 dBm

- c. Set the 1450-1 AUDIO LEVEL control for a -10 dBm level of the 10 kHz signal and then set the audio spectrum analyzer reference level to -20 dBm.

- d. **ADJUST** R58 on A44 for minimum harmonics. Note that R58 may have only a slight affect on harmonics. See Fig. 4-63.

**37. Adjust 1 MHz Bandpass Filter (L45, L55, L75 and L95 on A42 Audio Limiter board)**

- a. Set the first carrier null using parts a and b of step 35.
- b. Connect and set the test equipment as shown in Fig. 4-64.

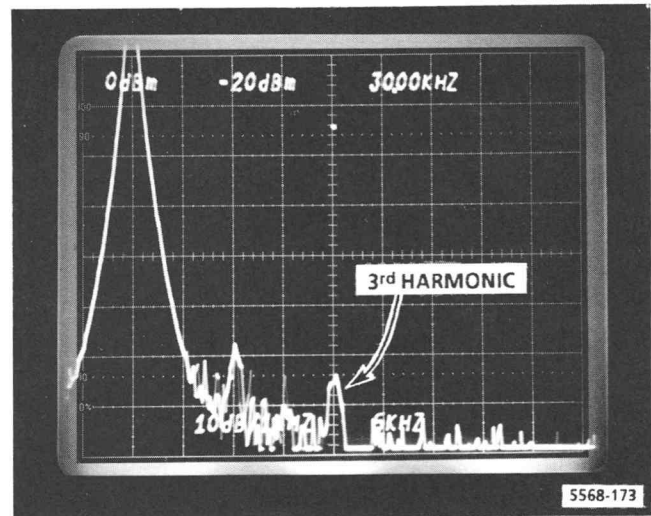


Fig. 4-63. Typical display when adjusting output amp bias.

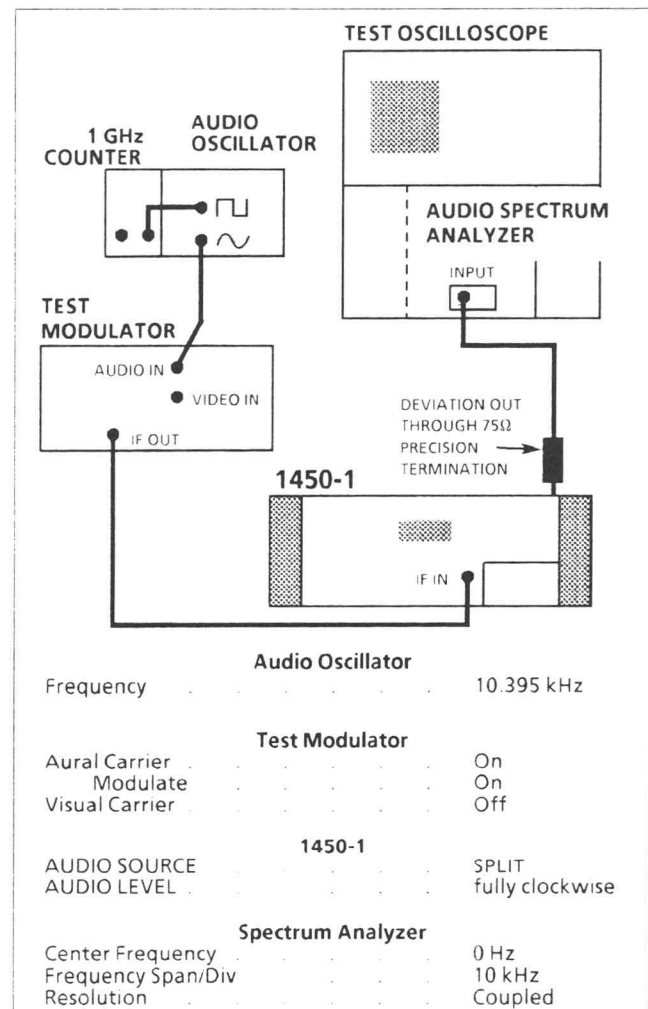


Fig. 4-64. Setup for adjusting 1 MHz bandpass filter



- c. Use the audio spectrum analyzer reference level var control to set the 10.395 kHz signal to the top horizontal graticule line.
- d. Ensure the jumper on J65 on A43 is on pins 2 & 3 (WIDE).
- e. Monitor TP22 on A42 with another test oscilloscope.
- f. **ADJUST** L45, L55, L75, and L95 for a maximum amplitude of the signal at TP22.

#### NOTE

Once L55 has been adjusted for a maximum amplitude it will not be adjusted again.

- g. Set the audio oscillator frequency to 60 kHz and display the second harmonic on the audio spectrum analyzer.
- h. **ADJUST** L75 and L95, in that order, repeating as necessary, to minimize the second harmonic.

#### NOTE

*This procedure was developed with a TEKTRONIX 7L5 Digital Storage spectrum analyzer. Part k of this step stores a trace that will be used in conjunction with the audio spectrum analyzer "B-(Save A)" function that characterizes the audio spectrum analyzer flatness. Always use the audio spectrum analyzer "B-(Save A)" function when monitoring flatness.*

- i. Connect the tracking generator output to the audio spectrum analyzer input. Position the trace in the top division of the display with the reference level control. Press "Save A" on the audio spectrum analyzer to store this trace as a reference.
- j. Connect the tracking generator output to the Test Modulator Audio Input and connect the DEVIATION OUT through a 75 $\Omega$  precision termination to the audio spectrum analyzer input. Position the waveform near the center of the screen, and turn "Display B" on. Turn "B-(Save A)" on, and turn "Display B" and "Display A" off.

- k. **ADJUST** L45 for the flattest frequency response possible to 150 kHz. See Fig. 4-65.

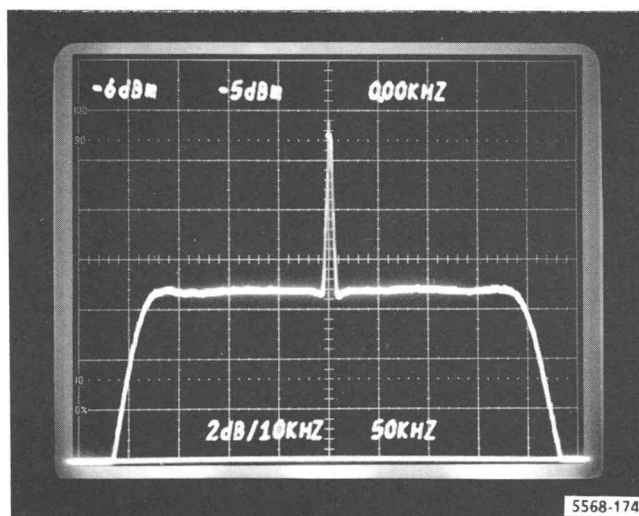


Fig. 4-65. Typical display when adjusting 1 MHz bandpass filter (deviation out).

- l. Connect the oscillator, set at 20 kHz, to the Test Modulator Audio Input. Set the audio spectrum analyzer mode to 10 dB/div.
- m. **ADJUST** L95 (and L75 if necessary) for minimum harmonics at least 60 dB down.
- n. **REPEAT** parts i through o of this step in the following sequence until no further improvement in harmonics or flatness is noticed:

Harmonics with the fundamental @ 60 kHz;  
Flatness to 150 kHz;  
Harmonics with the fundamental @ 20 kHz;  
Flatness to 150 kHz; repeat as necessary.

#### NOTE

*To verify that flatness and harmonics are within specification, perform step 25 in the PERFORMANCE CHECK PROCEDURE.*

#### 38. Adjust DEVIATION OUT and Aural Mode Center Frequency (R81 and R30 on A43 Audio Discriminator board)

- a. Set the first carrier null using parts a and b of step 35.
- b. Connect the DEVIATION OUTput through a 75 $\Omega$  precision termination and 75 $\Omega$  cable

to the true rms meter. Ensure the jumper on P65 on A43 is on pins 2 & 3 (WIDE).

- c. **ADJUST** R81 on A43 for 0.1768 V rms.
- d. Set the 1450-1 AURAL ONLY to ON and AUDIO SOURCE to SPLIT.
- e. Monitor TP51 on A53 with the test oscilloscope.
- f. **ADJUST** R30 on A43 for the lowest frequency sine wave possible below 1 kHz at TP51 on A53.

**39. Adjust 600Ω Balanced Line Output Level (R54 on A44 Audio Interface board) and Narrowband Gain (R71 on A43 Audio Discriminator board)**

**NOTE**

*Omit part a of this step if continuing from step 38.*

- a. Set the first carrier null using parts a and b of step 35.
- b. Connect the 600Ω BALANCED LINE output through the 600Ω matching switch to the true rms meter. Ensure the jumper on J54 on A44 is on pins 1 & 2 (WIDE).
- c. **ADJUST** R54 on A44 for a true rms meter readout of 0.442 V rms.
- d. Select the other line of the 600Ω BALANCED LINE output with the 600Ω matching switch.
- e. **CHECK** for a true rms meter readout of 0.442 V rms  $\pm$  8 mV rms.
- f. Move the jumper on J54 on A44 to pins 2 & 3 (NARROW).
- g. **ADJUST** R71 on A43 for a true rms meter readout of 1.225 V rms.
- h. Select the other line of the 600Ω BALANCED LINE output with the 600Ω matching switch.

- i. **CHECK** for a true rms meter readout of 1.225 V rms  $\pm$  20 mV rms.
- j. Move the jumper on J54 on A44 back to pins 1 & 2 (WIDE).

**40. Adjust Q-P Limiter (R50, R30, and R00 on A46 Q-P Limiter board)**

- a. Connect and set the test equipment as shown in Fig. 4-66.

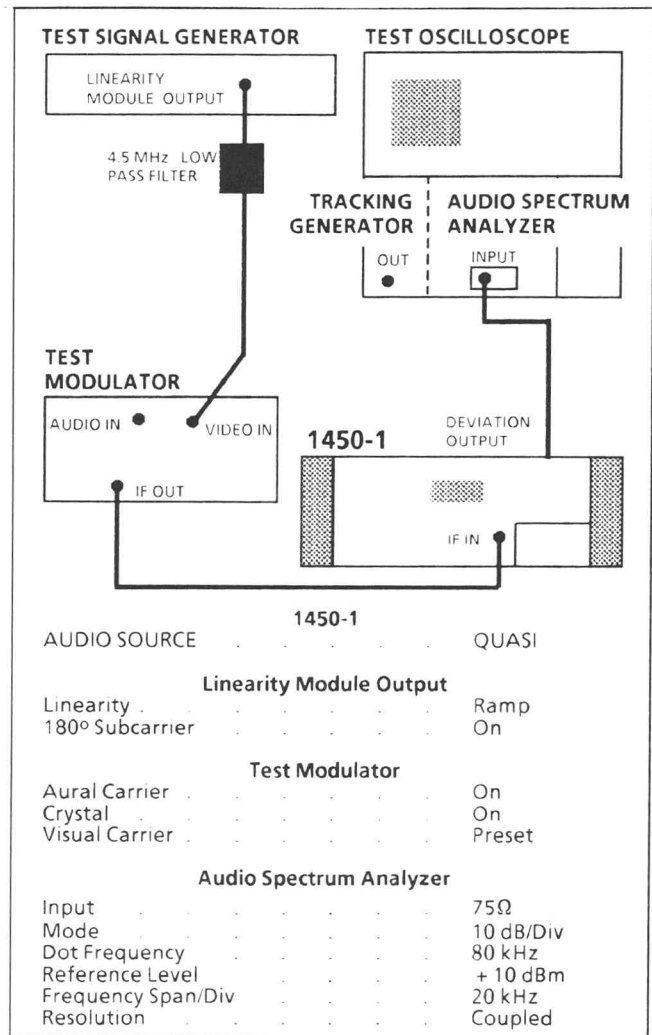


Fig. 4-66. Setup for adjusting Q-P limiter.

- b. Set R50 fully counterclockwise minus 1/8 turn.
- c. **ADJUST** R00, R30, and, if necessary, R50 for minimum video products. See Fig. 4-67.



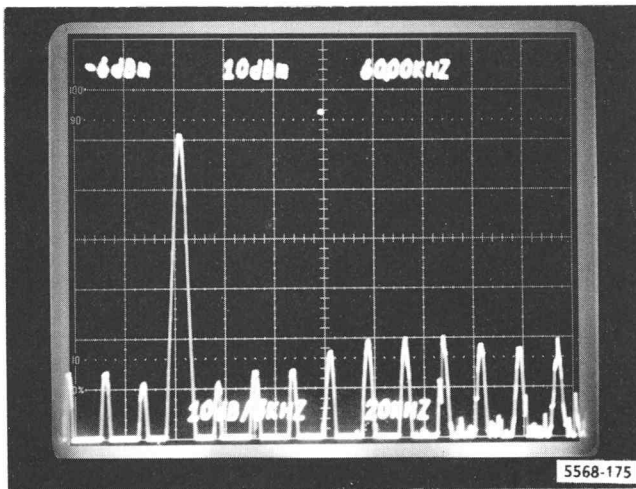


Fig. 4-67. Minimal video products.

41. Adjust Notch Filter (R59 on A44 Audio Interface board)

- Connect and set the test equipment as shown in Fig. 4-68.
- Ensure the jumper on J47 on A44 is on pins 2 through 5 (notch in).
- ADJUST** R59 on A44 for a minimum amplitude of the signal at 15.734 kHz.
- Connect the tracking generator output to the Test Modulator Audio Input.
- CHECK** for a sharp dip at 15.734 kHz.

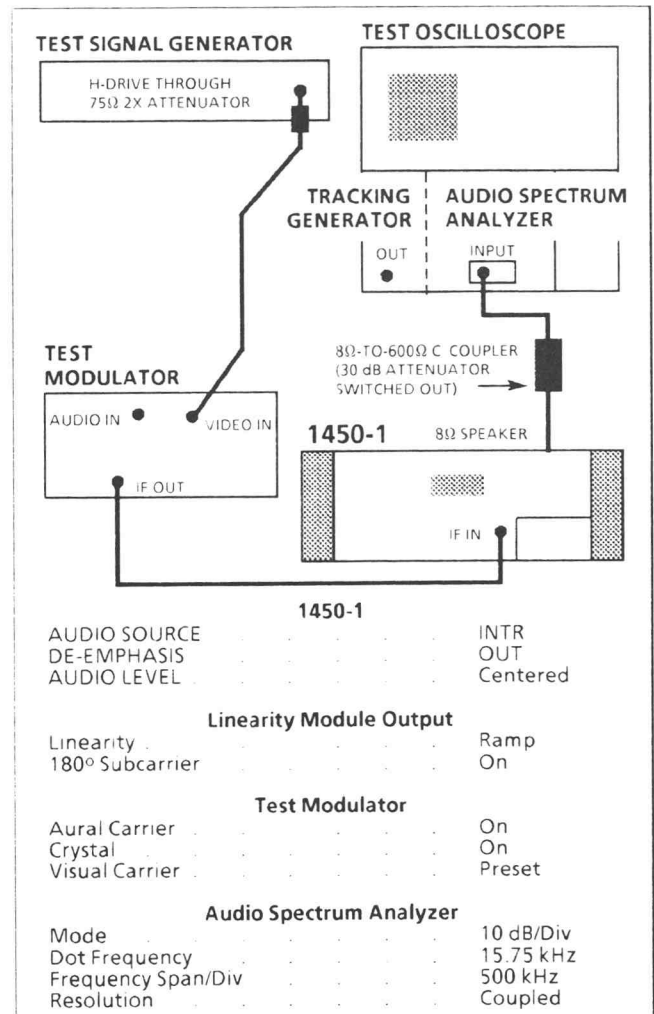


Fig. 4-68. Setup for adjusting notch filter.



# MAINTENANCE

## Introduction

This section describes the procedure for reducing or preventing instrument malfunctions, plus troubleshooting, and corrective maintenance. Preventive maintenance improves instrument reliability. Should the instrument fail to function properly, corrective measures should be taken immediately; otherwise, additional problems may develop within the instrument.

## PREVENTIVE MAINTENANCE

Preventive maintenance consists of cleaning, visual inspection, performance check, and if needed, readjustment. The preventive maintenance schedule that is established for the instrument should be based on the environment in which the instrument is operated and the amount of use. Under average conditions a preventive maintenance check should be performed every 3000 hours of instrument operation.

### Cleaning

Clean the instrument often enough to prevent dust or dirt from accumulating in or on it. Dirt acts as a thermal insulating blanket and prevents efficient heat dissipation. It also provides high-resistance electrical leakage paths between conductors or components in a humid environment.

**Exterior.** Clean the dust from the outside of the instrument by wiping or brushing the surface with a soft cloth or small brush. The brush will remove dust from around the front-panel controls and connectors. Hardened dirt may be removed with a cloth dampened in water that contains a mild detergent. Abrasive cleaners should not be used.

**Interior.** Clean the interior by loosening accumulated dust with a dry soft brush, then remove the loosened dust with low-pressure air to blow the dust clear. (High-velocity air can damage some components.) Hardened dirt or grease may be removed with a cotton tipped applicator dampened with a solution of mild detergent in water. Abrasive cleaners should not be used. If the circuit-board assemblies need cleaning, remove the circuit board by referring to the instructions under Corrective Maintenance in this section.

After cleaning, allow the interior to thoroughly dry before applying power to the instrument.

### CAUTION

*Do not allow water to get inside any enclosed assembly or components. Do not clean any plastic materials with organic cleaning solvents such as benzene, toluene, xylene, acetone, or similar compounds because they may damage the plastics.*

### Visual Inspection

After cleaning, carefully check the instrument for such defects as defective connections, damaged parts, and improperly-seated transistors and integrated circuits. The remedy for most visible defects is obvious; however, if heat-damaged parts are discovered, try to determine the cause of overheating before the damaged part is replaced; otherwise, the damage may be repeated.

### Transistor and Integrated Circuit Checks

Periodic checks of the transistors and integrated circuits are not recommended. The best measure of performance is the actual operation of the component in the circuit. Performance of these components is thoroughly checked during the performance check or adjustment procedures, and any substandard transistors or integrated circuits will usually be detected at that time.

### Static-Sensitive Components

### CAUTION

*Static discharge can damage any semiconductor component in this instrument.*

This instrument contains electrical components that are susceptible to damage from static discharge. See Table 5-1 for relative susceptibility of various classes of semiconductors. Static voltages of 1 kV to 30 kV are common in unprotected environments.

Observe the following precautions to avoid damage:

1. Minimize handling of static-sensitive components.

2. Transport and store static-sensitive components or assemblies in their original containers, on a metal rail, or on conductive foam. Label any package that contains static-sensitive assemblies or components.

3. Discharge the static voltage from your body by wearing a wrist strap while handling these components. Servicing static-sensitive assemblies or components should be performed only at a static-free work station by qualified personnel.

4. Nothing capable of generating or holding a static charge should be allowed on the work station surface.

5. Keep the component leads shorted together whenever possible.

6. Pick up components by the body, never by the leads.

7. Do not slide the components over any surface.

8. Avoid handling components in areas that have a floor or work-surface covering capable of generating a static charge.

9. Use a soldering iron that is connected to earth ground.

10. Use only special antistatic suction-type or wick-type desoldering tools.

**Table 5-1**  
**RELATIVE SUSCEPTIBILITY TO**  
**STATIC DISCHARGE DAMAGE**

Semiconductor Classes	Relative Susceptibility Levels <sup>a</sup>
MOS or CMOS microcircuits or discretes, or linear microcircuits with MOS inputs (Most Sensitive) . . . . .	1
ECL . . . . .	2
Schottky signal diodes . . . . .	3
Schottky TTL . . . . .	4
High-frequency bipolar transistors . . . .	5
JFETS . . . . .	6
Linear Microcircuits . . . . .	7
Low-power Schottky TTL . . . . .	8
TTL (Least Sensitive) . . . . .	9

<sup>a</sup>Voltage equivalent for levels:

1 = 100 to 500 V	4 = 500 V	7 = 400 to 1000 V (est.)
2 = 200 to 500 V	5 = 400 to 600 V	8 = 900 V
3 = 250 V	6 = 600 to 800 V	9 = 1200 V

(Voltage discharged from a 100 pF capacitor through a resistance of 100 ohms.)

### Performance Checks and Readjustment

The instrument performance should be checked after each 3000 hours of operation, or every six months if the instrument is used intermittently, to ensure maximum performance and assist in locating defects that may not be apparent during regular operation. Instructions for conducting a performance check are provided in the Calibration section.

## TROUBLESHOOTING

The following are a few aids and suggestions that may assist in locating a problem. After the defective assembly or component has been located, refer to the Corrective Maintenance part of this section for removal and replacement instructions.

### NOTE

*No repair should be attempted during the warranty period or by unqualified personnel.*

### Troubleshooting Aids

**Foldout Pages.** The foldout pages at the back of the manual contain significant information useful for troubleshooting the instrument. Block and schematic diagrams, waveforms, circuit board illustrations, parts locating charts, and integrated circuit (ic) diagrams are located on foldout pages. See Fig. 5-1.

Diagrams. Block and circuit diagrams are the most often used aids to troubleshooting. The circuit number and electrical value of each component is shown on the diagrams (see the first page in the Diagrams section for definition of the reference symbology used to identify components in each circuit). Refer to the Replaceable Electrical Parts list for a complete description of each component. Those portions of the circuit that are mounted on circuit boards or assemblies are enclosed in a gray border, with the name and assembly number shown on the border.

### NOTE

*Check the Change Information section at the rear of the manual for inserts describing corrections and modifications to the instrument and manual.*

**Circuit Board Illustrations.** Electrical components, connectors, and test points are identified on circuit board illustrations located on the inside fold of the corresponding circuit diagram, or the back of the preceding diagram.

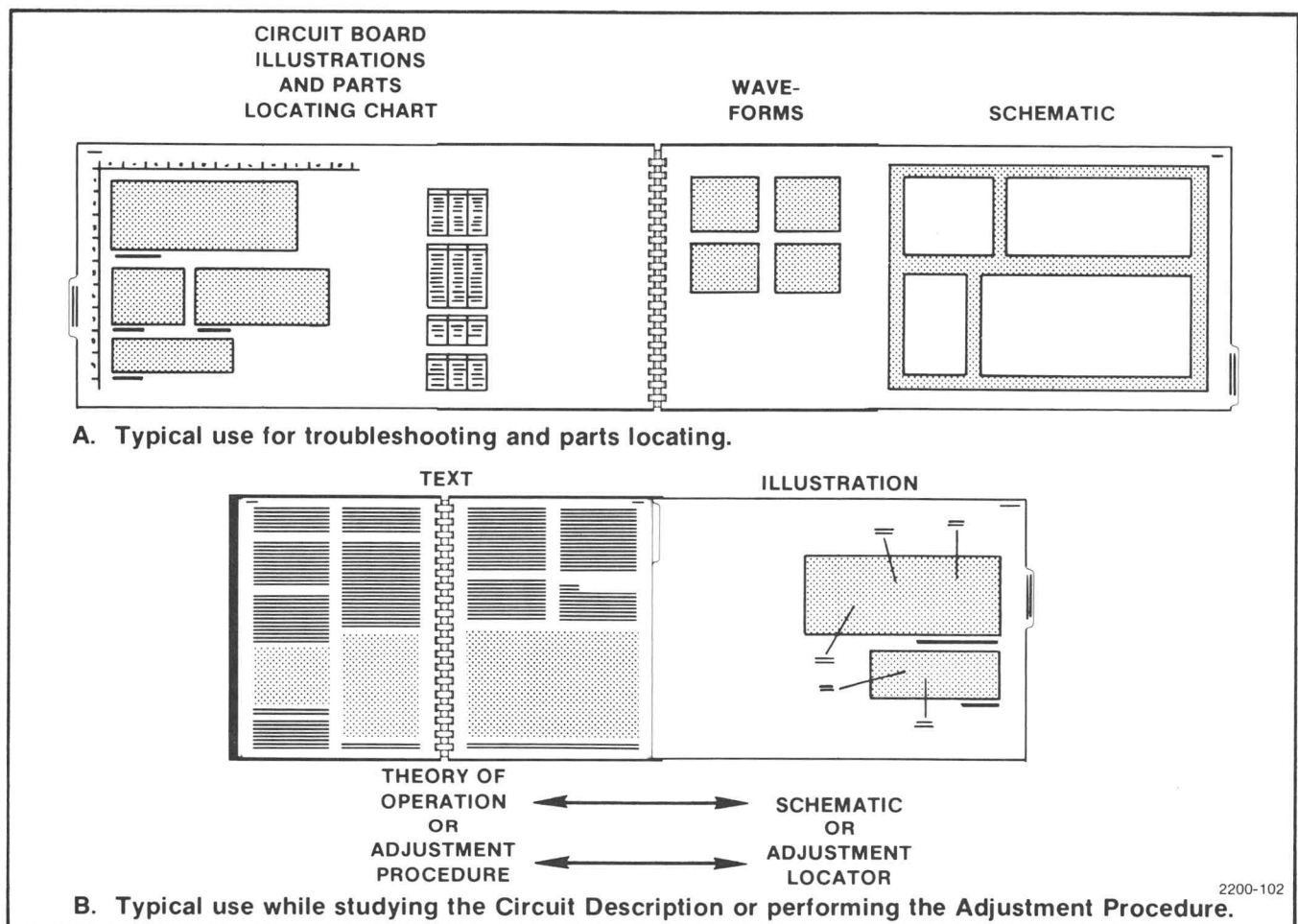


Fig. 5-1. Using the Foldout Pages.

**Parts Locating Charts.** The schematic diagrams and the circuit board illustrations are assigned location grids. A parts locating chart for each assembly gives grid locations of components on both the circuit board and the schematic.

**Assembly and Circuit Numbering.** The circuit boards and other assemblies (except for the chassis and the front and rear panel components) are assigned assembly numbers that generally follow the signal path through the instrument. See Fig. 5-2.

Each component is assigned a circuit number according to its geographic location within an assembly.

The Replaceable Electrical Parts list is arranged in assembly by assembly order, as designated by ANSI Standard Y32.16-1975. The circuit number in the parts list is made up by combining the assembly number and the circuit number.

EXAMPLE: R25 on A61 would be listed in the parts list as A61R25.

In the case of chassis, and front- and rear-panel mounted parts which have no assembly number, the parts list number is the same as shown on the schematic. Any one- or two-digit circuit number in the parts list is a part mounted on the front or rear panel, or the chassis.

#### NOTE

*The parts list number should be used when ordering replacement parts.*

**Components.** Wire Color Codes. Insulated wires are color-coded to facilitate circuit tracing. Table 5-2 summarizes the coding system used in this instrument.

Table 5-2

WIRE COLOR CODES

Color Code	Significance
Black	Chassis Ground
White on Black	Floating Ground
Yellow on Green	Safety Ground
Gray <sup>a</sup>	AC Line
White <sup>a</sup>	Signal
Red <sup>b</sup>	+Vcc
Violet <sup>b</sup>	-Vcc

<sup>a</sup>Color stripes are used on these wires as an aid to circuit tracing.

<sup>b</sup>Color strip on wire indicates position of supply with respect to 0 volt (e.g., a black stripe on a red wire would be the first voltage in the positive direction). If a second stripe is used (white only), this indicates a non-regulated supply.

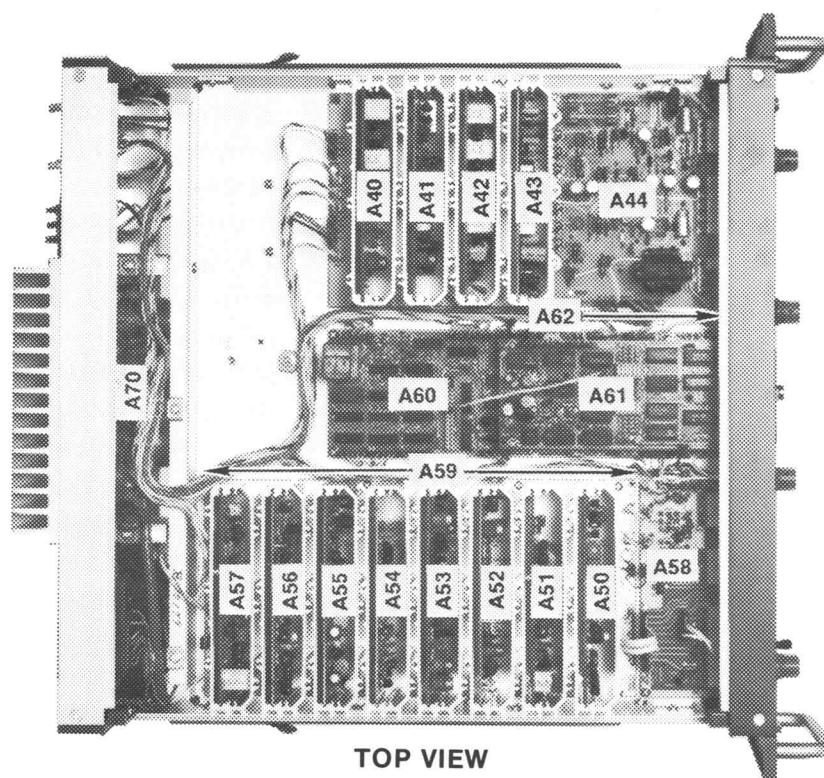
**Connectors.** Intercircuit connections are made by various connector types. Pin connectors are used for board-to-board connections on a common interface board. Multiple terminal connectors in harmonica-type plastic holders are used for wire cable interconnection of boards. The terminals in the holder are identified by numbers that appear on the holder and the circuit diagrams. Connector orientation to the circuit board is keyed by triangles on the holder and the circuit board (see Fig. 5-3). Coaxial connectors for board-to-board and board-to-panel mounted bnc connectors are the Peltola type.

#### NOTE

*When reconnecting a Peltola connector, be careful to avoid bending the coaxial center conductor.*

All connectors are identified on the schematic and board with "P" numbers.

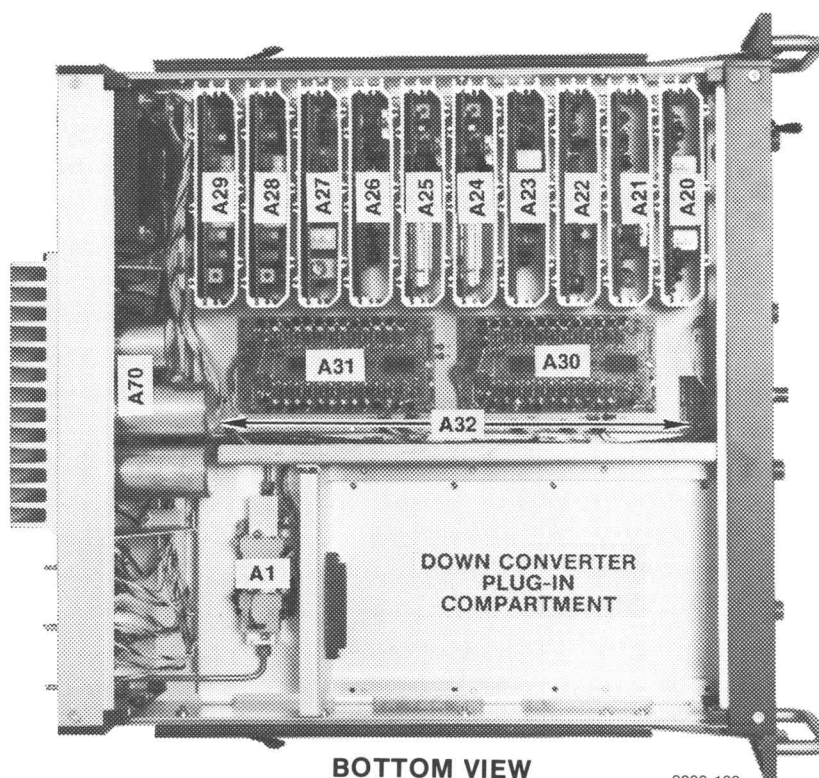
**Resistors.** Composition (brown body), metal-film (gray or light blue body), power, and chip resistors are used in this instrument. The resistance values of composition and metal film resistors are color coded on the component with EIA color code (some metal film resistors may have the value printed on the body). Chip resistors are generally too small to be marked, and therefore should be handled cautiously to avoid mixing resistors of different values if replacing more than one.



TOP VIEW

- A40 First Audio Mixer Board
- A41 Second Audio Mixer Board
- A42 Audio Limiter Board
- A43 Audio Discriminator Board
- A44 Audio Interface Board
- A50 Reference Control Board
- A51 Reference Oscillator Board
- A52 Phase Shifter Board
- A53 Converter Phase Lock Board
- A54 Detector-LO Switch Board
- A55 Limiter Board
- A56 Converter Control Board
- A57 Converter Oscillator Board
- A58 Phase Lock Switch Board
- A59 Phase Lock Interface Board
- A60 AGC Control Board
- A61 Readout Driver Board
- A62 Readout Board
- A70 Power Supply

- A1 RF Attenuator
- A20 IF Filter-Amplifier Board
- A21 IF Attenuator-Amplifier Board
- A22 IF Attenuator-Mixer-Filter Board
- A23 IF Switch-Aural Drive Board
- A24 IF SAW Amplifier (Narrow Band) Board
- A25 IF SAW Amplifier (Wide Band) Board
- A26 IF Post Amplifier Board
- A27 IF Zero Carrier-Phase Shifter Board
- A28 IF Detector-Video Amplifier (Quadrature) Board
- A29 IF Detector-Video Amplifier (Video) Board
- A30 PIN Driver Board (drives A21)
- A31 PIN Driver Board (drives A22)
- A32 IF Interface Board
- A70 Power Supply



BOTTOM VIEW

2200-103

Fig. 5-2. Assembly Locations.



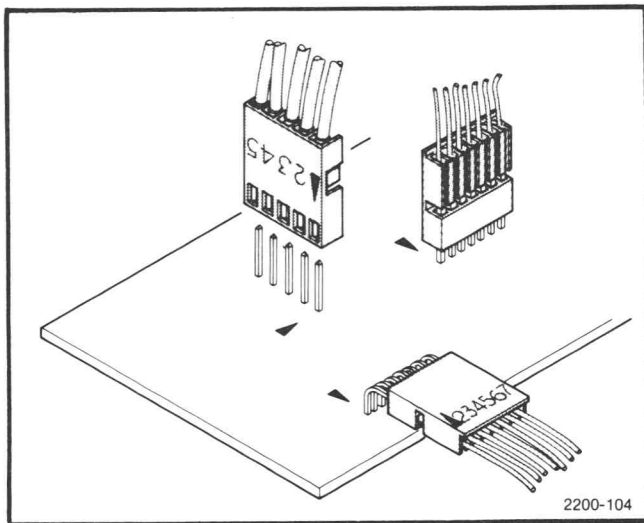


Fig. 5-3. Multipin Interconnect Connectors.

**Capacitors.** The capacitance value of common disc capacitors or small electrolytics are marked in microfarads or picofarads on the side of the component body. The white ceramic capacitors and tantalum electrolytics are color coded. Chip capacitors are generally too small to be marked, and so again, care should be taken against mixing more than one value of chip component at a time.

**Diodes.** The cathode of each glass encased diode is indicated by a stripe, a series of stripes, or a dot. Some diodes have a diode symbol printed on one side.

Most diodes can be checked in the circuit by taking measurements across the diode and comparing these with voltages listed on the diagram. Forward-to-back resistance ratios can usually be taken by referring to the schematic and pulling appropriate transistors and pin connectors to remove low-resistance loops around the diode.

**CAUTION**

*Do not use an ohmmeter scale with a high external current to check the diode junction.*

**Transistors.** Lead identification for the transistors and ic is shown in Fig. 5-4.

Semiconductor failures account for the majority of electronic equipment failures. Substitution is often the most practical means for checking their performance. The following guidelines should be followed when substituting these components:

1. First determine that circuit voltages are safe for the substituted component, so the replacement will not be damaged.
2. Use only good components for substitution.
3. Turn the power off before a component is substituted.
4. Be sure the component is inserted properly in its socket (see Fig. 5-4 or the manufacturer's data sheet).
5. After the operational check, return the good components to their original sockets to reduce calibration time and burn-in period.

**NOTE**

*When replacing transistors mounted with heat sinks, check that they have adequate heat conducting grease (Tektronix Part No. 006-0625-00) for proper thermal conduction.*

**WARNING**

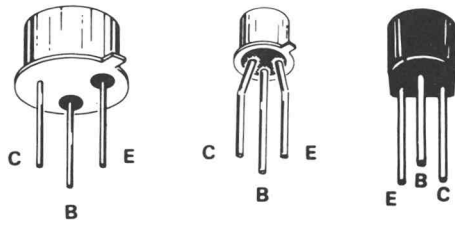
*Handle thermal conducting grease with care. Avoid getting the grease in eyes. Wash hands thoroughly after use.*

**NOTE**

*If a substitute is not available, check the transistor with a dynamic tester such as the TEKTRONIX Type 577 Curve Tracer. Static type testers, such as an ohmmeter, can be used to check the resistance ratio across some semiconductor junctions if no other method is available. Use the high resistance ranges ( $R \times 1k$  or higher) so the external test current is limited to less than 6 mA. If uncertain, measure the external test current with an ammeter. Resistance ratios across base-to-emitter or base-to-collector junctions usually run 100:1 or higher. The ratio is measured by connecting the meter leads across the terminals, noting the reading, then reversing the leads and noting the second reading.*



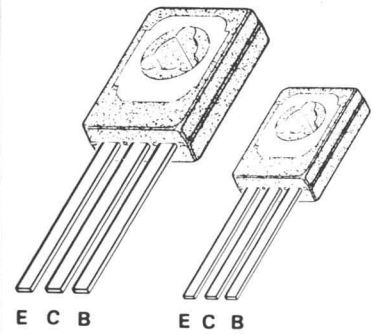
## TRANSISTORS



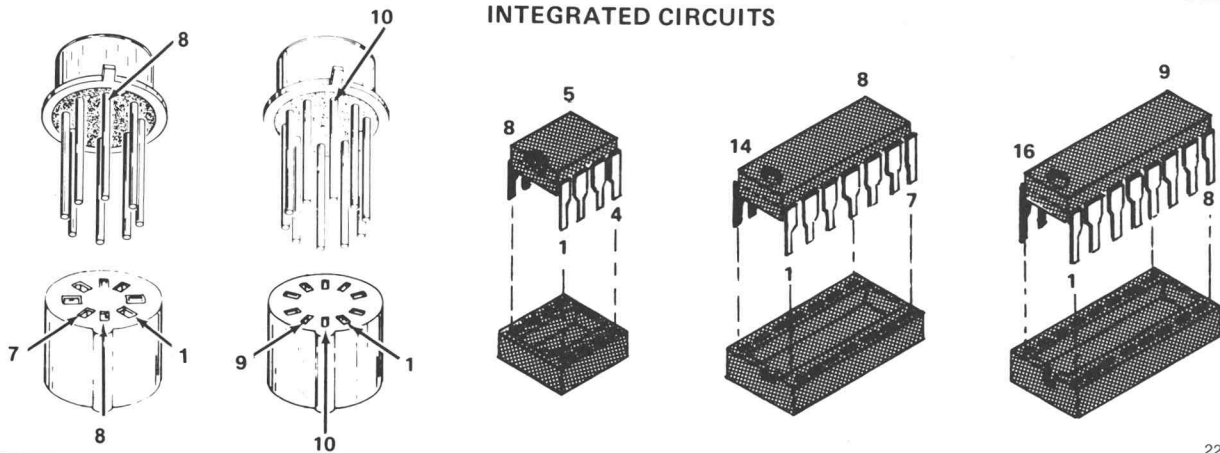
## DUAL FET



## POWER TRANSISTORS



## INTEGRATED CIRCUITS



2200-105

Fig. 5-4. Semiconductor Lead Identification.

**Integrated Circuits (ic).** Integrated circuits are most easily checked by direct replacement. When substitution is impossible, check input and output signal states as described in the circuit description and on the diagram. Lead configurations for the ic used in this instrument are provided on the inside fold of the schematic or the back of the previous schematic.

Check calibration and performance after a faulty component has been replaced.

If the above procedure fails to locate the trouble, a more detailed analysis must be performed. The Circuit Description section describes the operational theory of each circuit, and may aid to further evaluate the problem.

### General Troubleshooting Technique

The following procedure is recommended to isolate a problem and expedite repairs.

1. Ensure that the malfunction exists in the instrument. Check the operation of associated equipment and the operating procedure of the instrument (see Operating Instructions).

2. Determine and evaluate all trouble symptoms. Try to isolate the problem to a circuit or assembly. The block diagram in the Diagrams section can aid in signal tracing and circuit isolation. The circuit boards are generally connected by coaxial cables, so the stages can be checked stage by stage. A spectrum analyzer and tracking generator are convenient tools for these checks.

#### CAUTION

*When measuring voltages and waveforms, use extreme care in placing meter leads or probes. Because of high component density and limited access within the instrument, an inadvertent movement of the leads or probe could cause a short circuit. This may produce transient voltages that can destroy many components.*

3. Make an educated guess as to the nature of the problem, such as component failure or calibration, and the functional area most likely at fault.

4. Visually inspect the area or the assembly for such defects as broken or loose connections, improperly seated components, overheated or burned components, chafed insulation, etc. Use a magnifying glass or a jewelers eye loupe to inspect chip parts. Repair or replace

all obvious defects. In the case of overheated components, try to determine the cause of the overheated condition and correct before reapplying power.

5. By successive electrical checks, locate the problem. At this time, an oscilloscope and spectrum analyzer are valuable test items for evaluating circuit performance. If applicable, check the calibration adjustments. Before changing an adjustment, note its position so it can be returned to the original setting. This will facilitate recalibration after the trouble has been located and repaired.

6. Determine the extent of the repair needed; if complex, we recommend contacting your local Tektronix Field Office or representative. If minor, such as a simple component replacement, see the Replaceable Electrical Parts list for replacement information. Removal and replacement procedure of the assemblies is described under Corrective Maintenance.

**Troubleshooting Shield-Mounted Boards (see Fig. 5-5).** The extender board (included in the standard accessories kit) allows the shield-mounted boards to be extended out of the shield for troubleshooting or calibration. Extra pins are added to the interface boards where necessary to provide grounds for signal connections. To look at the output of a stage, remove the following board and connect a bnc-to-square pin adapter cable to the input pins. This will give the output of the stage under test. To isolate a board or stage, remove both the input and output stages. A signal can be fed and the output measured for this stage only.

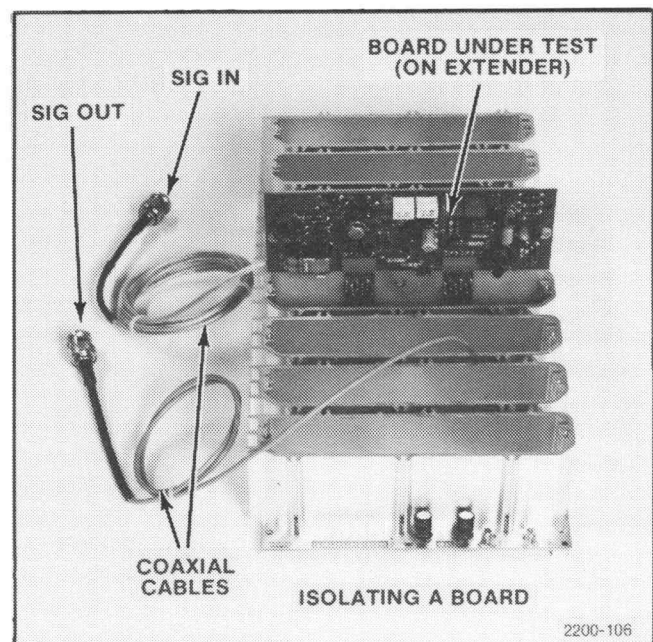


Fig. 5-5. Troubleshooting Shield Mounted Boards.

Refer to the Corrective Maintenance portion of this section for instructions on removing the shield-mounted boards.

**Troubleshooting the Power Supply.** Access to the power-supply board may be gained by removing the board and heat sink from the rear panel as an assembly. A procedure for this is detailed in the Corrective Maintenance portion of this section.

#### NOTE

*Be sure to connect a ground strap between the power-supply board and chassis ground when operating the instrument with the power supply detached.*

## CORRECTIVE MAINTENANCE

Corrective maintenance consists of component replacement and instrument repair. Special techniques and procedures, required to replace components in this instrument, are described here.

### Obtaining Replacement Parts

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix Field Office or representative will contact you concerning any change in the part number. After repair, the circuits may need recalibration.

### Nonreplaceable Parts

There are several components and circuits in the 1450-1 that are not directly replaceable. We recommend that you contact your local Tektronix Field Office or representative concerning servicing of these parts.

**PIN Driver and PIN Diodes.** New Programmable Read Only Memories (PROMs) must be programmed if one of the old PROMs or precision resistors on the PIN Driver board, or a pin diode in the PIN Attenuator circuit needs to be replaced. Because each PROM program is unique, the PROMs and pin diodes are not directly replaceable. The affected boards are A30/A21 and A31/A22. The board-pair A30/A21 must be replaced if a pin diode on A21, or a PROM and/or a precision resistor on A30 needs to be replaced. The same applies to A31/A22 board-pair. Each pair of boards is listed under one assembly in the Replaceable Electrical Parts list, namely:

1. A80—Tektronix Part No. 672-0638-00 for A30/A21 pair.

2. A82—Tektronix Part No. 672-0639-00 for A31/A22 Opt. 01 and Opt. 02 and A82 Tektronix Part No. 672-0639-01 for A31/A22 Opt. 03.

See the Replaceable Electrical parts list for replacement information.

### Selected Components

During calibration at the factory, some components are selected, if necessary, to help the instrument meet the performance requirements. Table 5-3 lists these components, their nominal values, and the criteria for selection.

Table 5-3

SELECTED COMPONENTS

Component Number	Nominal Value	Selection Criteria
A20R07	39.2 $\Omega$	50 $\Omega$ IF Input Impedance.
A21C85	Open	Return Loss.
A22R52	10 $\Omega$ or open	Mixer Balance.
A22R53	10 $\Omega$ or open	Mixer Balance.
A24C90	15—30 pF	SAW filter and amplitude compensation.
A24R90	500 $\Omega$ or greater	SAW filter tilt and amplitude compensation.
A25C90	3—24 pF	SAW filter tilt and amplitude compensation.
A25R90	500 $\Omega$ or greater	SAW filter tilt and amplitude compensation.
A28R40	100 k $\Omega$ or greater	Dc unbalance with temperature.
A28R43	100 k $\Omega$ or greater	Dc unbalance with temperature.
A29R40	100 k $\Omega$ or greater	Dc unbalance with temperature.
A29R43	100 k $\Omega$ or greater	Dc unbalance with temperature.
A55R04	332 $\Omega$	Limiter phase shift.

## Soldering Chip Components (See Fig. 5-6)

Many circuit boards in this instrument have chip components. The contacts on chip resistors and capacitors are usually plated with silver. These components should be soldered with a 3% silver-bearing solder (Tektronix Part No. 006-0064-00).

Remove excess solder from the circuit-board pads before soldering so the component will lie flat. If the first solder joint is made with the component at an angle, soldering the second joint will cause pressure to be applied to the first, possibly breaking it. Use solder wick or other solder removers to remove the excess solder and clean the surface.

### CAUTION

*Do not apply a soldering iron directly to the chip component contacts. This will burn the silver plating.*

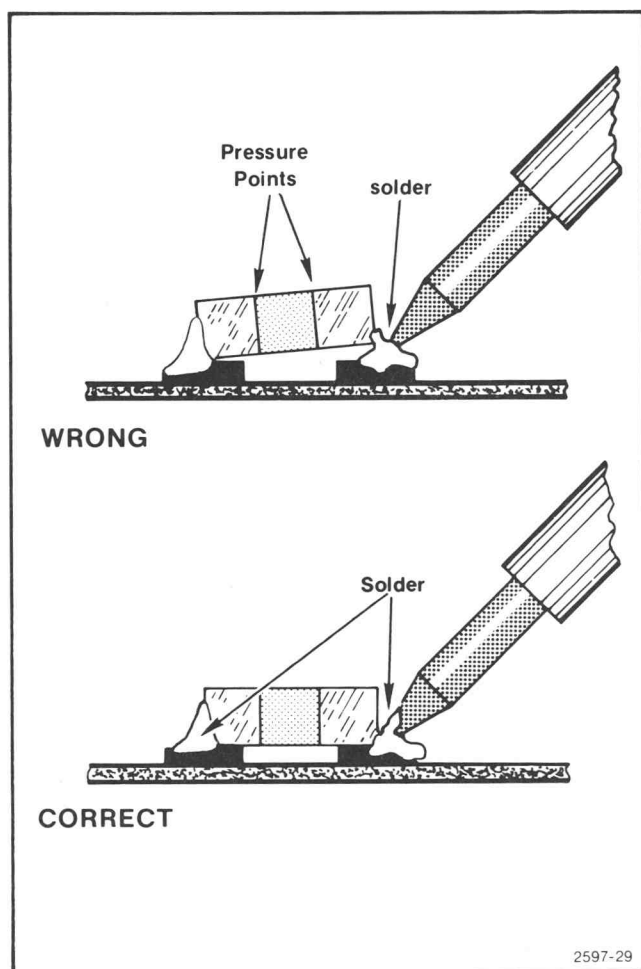


Fig. 5-6. Soldering Chip Components.

## TORX® Screws

This instrument uses self-tapping TORX head screws. A TORX screwdriver is supplied in the accessories kit for the 1450-1. Also, a tip for magnetic-tip or air-driven screwdrivers is available (Tektronix Part No. 003-0814-00).

Do not use more than about 8 to 10 inch-pounds of torque when tightening the TORX screws. If a screw head breaks off, leaving the screw body in the metal, the screw should be replaced using the following procedure:

1. Remove any other screws holding down the shield cover, and lift the cover off. This will expose part of the screw stud.
2. Use a pair of pliers to remove the screw.
3. Replace the shield cover, and insert a 3 mm X 20 mm TORX screw (Tektronix Part No. 213-0812-00).

TORX® is a registered trademark of Camcar Screw & Mfg.

## Fuse Replacement

Three fuses are used in this instrument. The line fuse is located in the rear-panel line-voltage selector, the +5 V fuse is located on the Power-Supply board (A70), and the Audio Output fuse is located on the Audio Interface board (A44). Use only correct value fuses when replacing.

### NOTE

*There is a spare audio fuse on the Audio Interface board, A44.*

## Power Transformer Replacement

If the power transformer becomes defective, contact your local Tektronix Field Office or representative for replacement. Replace only with a direct-replacement Tektronix transformer.

## Power Switch Replacement

If the power switch becomes defective, replace only with a direct-replacement, safety-approved switch. Use the following replacement procedure.

1. Remove the left side panel and the left front corner piece.

**NOTE**

*An alternate method is to remove the IF Interface board (A32).*

2. Remove the twelve-sided nut and washer from the front panel.
3. Pull the power switch back from the front panel, and remove the screws holding the power cable. (Note the locations of the wires on the switch for replacement.)

To replace, reverse the procedure.

**Pushbutton Switch Replacement**

Before removing a pushbutton switch, disengage the pushbutton actuating arm so that it does not project beyond the rear of the switch. Next, carefully pry back the plastic retainer clip at the rear of the switch with the tip of a small screwdriver. See Fig. 5-7. Remove by lifting the switch body up and back from the front retainer clip.

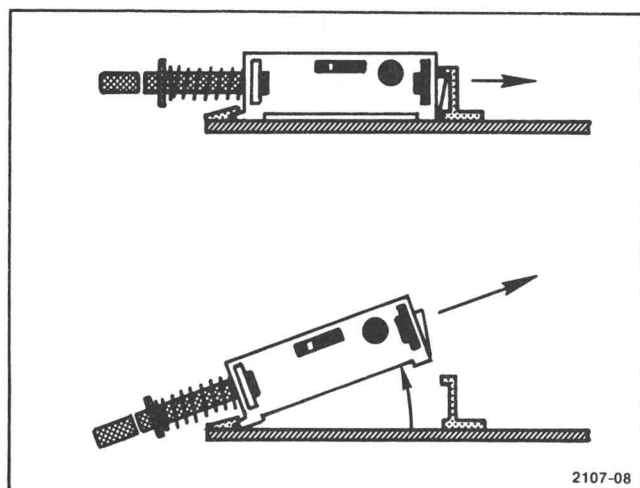


Fig. 5-7. Replacing Pushbutton Switches.

**Indicator Lamp Replacement**

Use the following procedure to remove LED indicator lights:

1. Pull the harmonica connector from the LED leads.
2. Grasp the outer ring at the rear of the light with needle-nose pliers, and remove.

3. Grasp both leads with the pliers and pull the LED out of the front-panel assembly.

To replace, reverse the procedure. Figure 5-8 illustrates the polarity of connections to be observed.

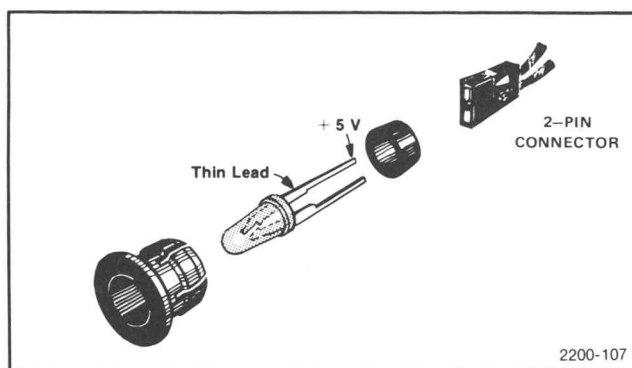


Fig. 5-8. Indicator Lamp Replacement.

**Square Pin Replacement**

A pin replacement kit including necessary tools, instructions, and replacement pins is available from Tektronix, Inc. Order Tektronix Part No. 040-0542-00.

**Replacing Assemblies****Replacing the Attenuator Assembly (A1)****CAUTION**

*Do not disassemble the attenuator. Replace as a unit.*

1. Remove the harmonica connectors at P10 and P20 of A1 (note their positions for replacement).
2. Loosen the semi-rigid coaxial-lead connectors, using a 5/16-inch open-end wrench.
3. Loosen and remove the attenuator mounting screws located on the opposite side of the chassis.
4. Remove the attenuator.

To replace, reverse the procedure.

**CAUTION**

*When reconnecting the semi-rigid cables, be sure that the connectors fit smoothly into the attenuator connectors.*

### Replacing Shield-Mounted Boards

Each shield-mounted board has a tooling hole for extracting the board from the shield. A small screwdriver or the tip of a pair of needle-nose pliers may be used as levers against the shield to get the board loose. A simple extracting tool may be made from a large paper clip, as shown in Fig. 5-9.

To remove the boards:

1. Remove the shield cover from the desired board location.
2. Use an extraction tool to remove the board.



*When replacing the board into the shield, keep the board to the outside rail (fin side) of the shield to align on the proper interface-board pins. Avoid forcing the board, as pins may be easily bent.*

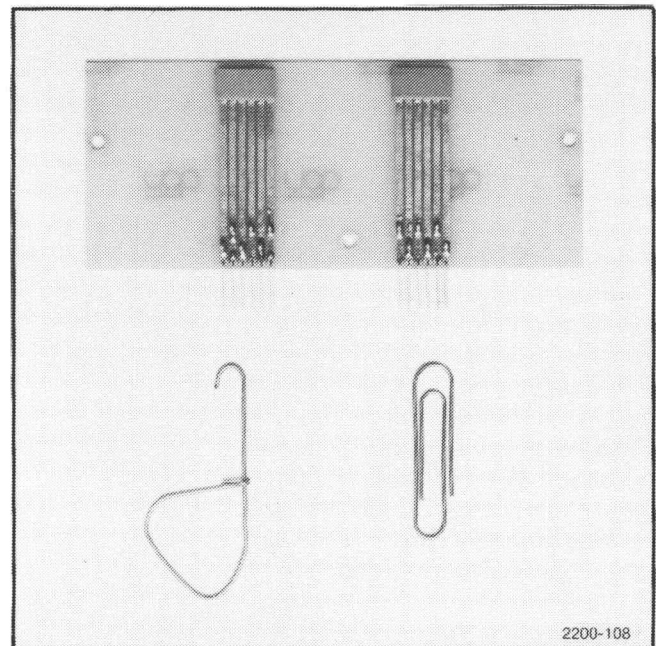


Fig. 5-9. Circuit Board Extracting Tool and Extender Board.

### Replacing the IF Interface Board (A32) (See Fig. 5-10)

1. Remove all wire connectors from the board.

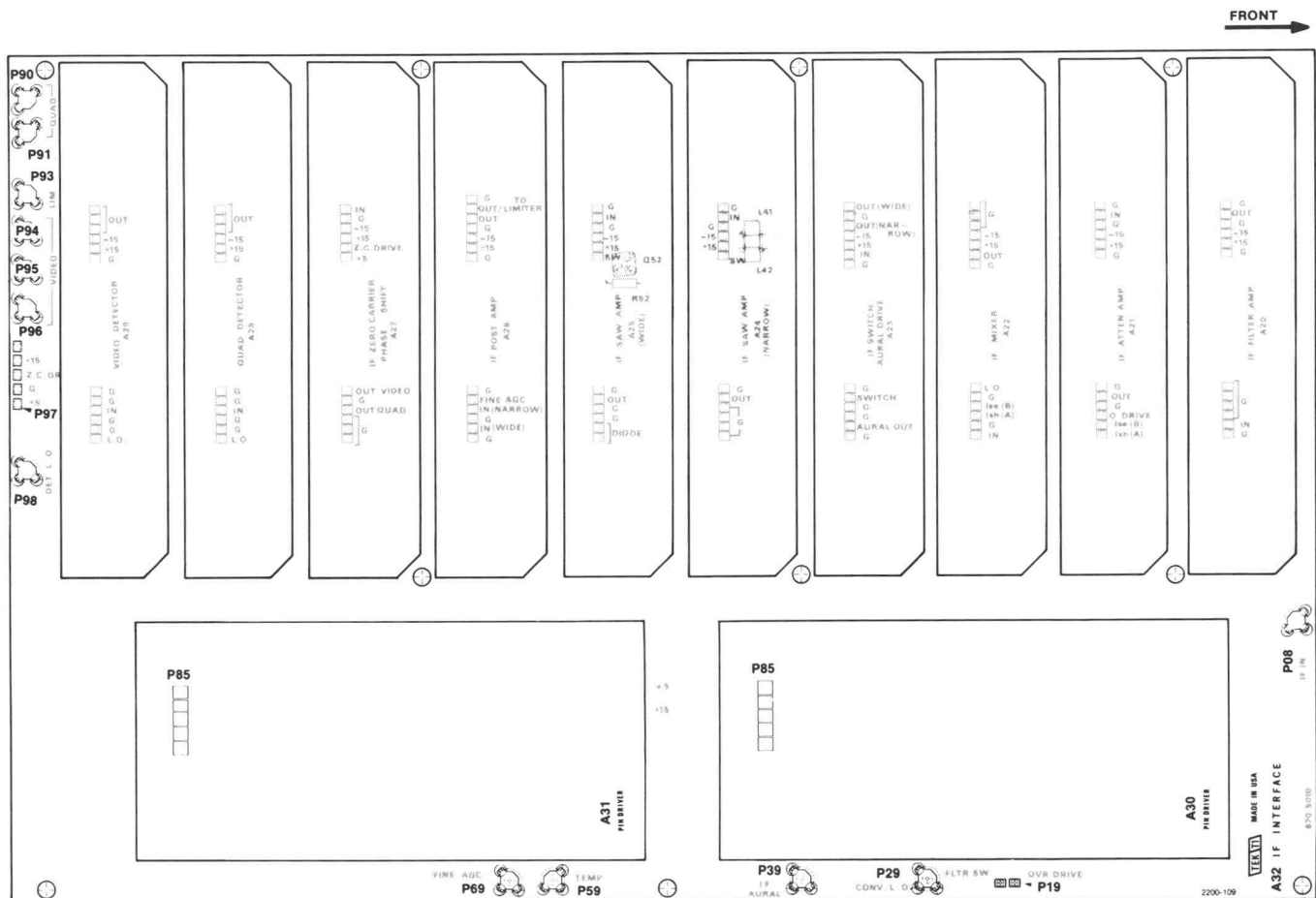


Fig. 5-10. Replacing the IF Interface Board (A32).

2. Remove the eleven screws holding the board down.

To replace, reverse the procedure. Be careful not to bend the square pins or the center conductor of the Peltola cable connectors.

#### Replacing the Phase Lock Interface Board (A59) (See Fig. 5-11)

1. Remove the wire connectors from both ends of the board.

2. Remove the eight screws (four on each side) from the sides of the board.

3. Remove the board.

To replace, reverse the procedure. Be careful when replacing the wire connectors. See that the square pins and Peltola center conductors aren't bent.

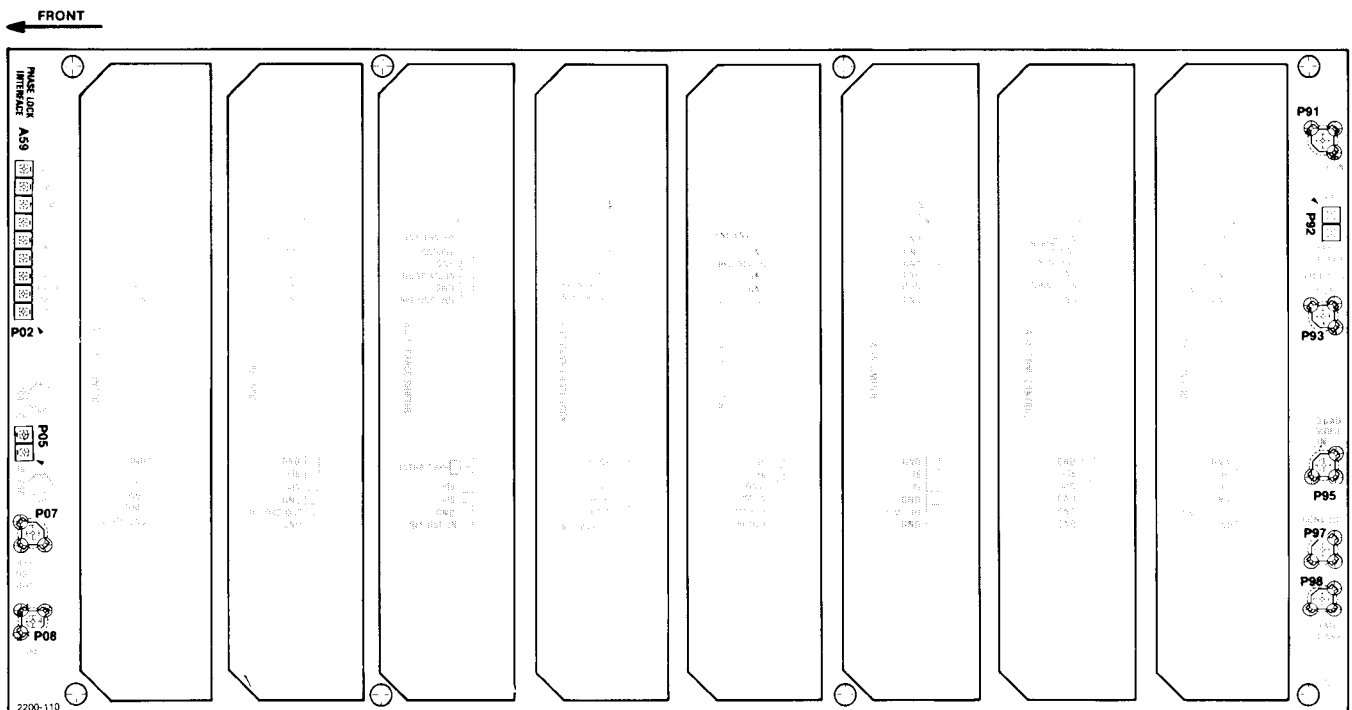


Fig. 5-11. Replacing the Phase Lock Interface Board (A59).

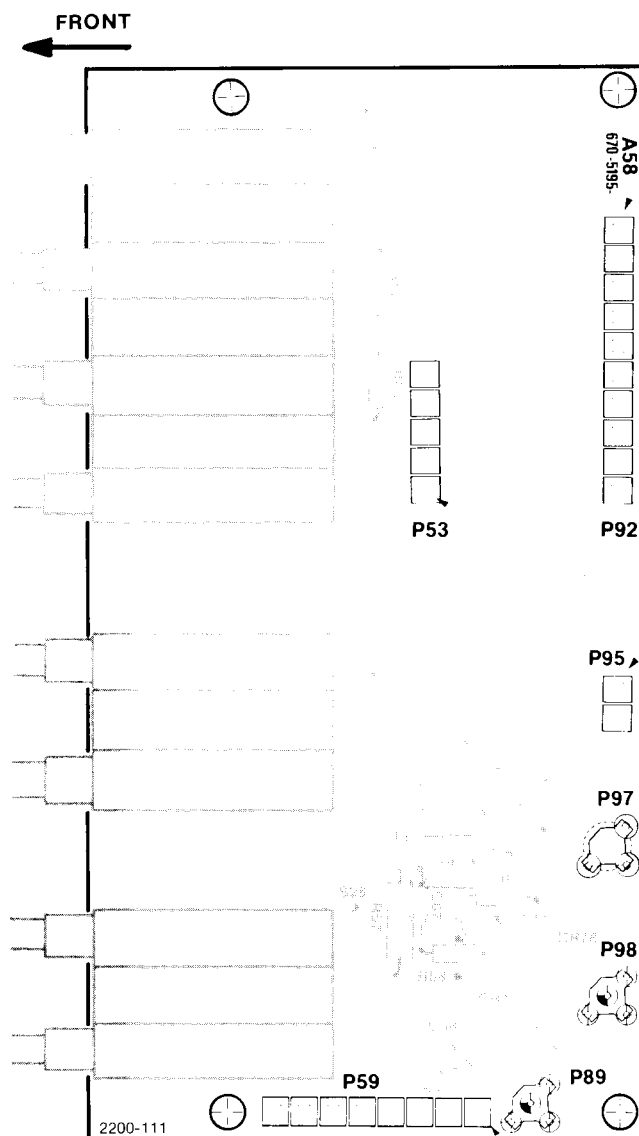
**Replacing the Phase Lock Switch Board (A58) (See Fig. 5-12)**

1. Remove the wire connectors to P02, P05, P07, and P08 on the Phase Lock Interface board (A59).

2. Remove the wire connectors to P53, P59, and P98 on the Phase Lock Switch board (A58).

3. Remove the board.

To replace, reverse the procedure. Be careful when replacing the wire connectors. See that the square pins and Peltola center conductors aren't bent.



**Fig. 5-12. Replacing the Phase Lock Switch Board (A58).**



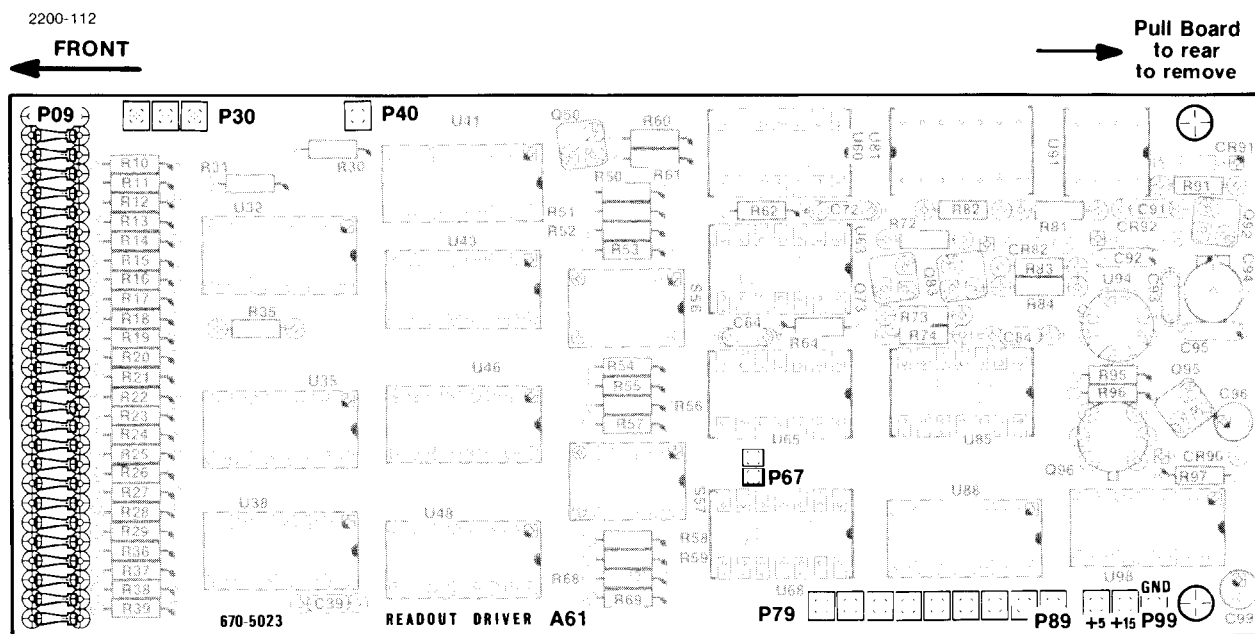


Fig. 5-13. Replacing the Readout Driver Board (A61).

**Replacing the Readout Driver Board (A61) (See Fig. 5-13)**

1. Remove all harmonica connectors from the Readout Driver board (A61).

2. Remove the two screws from the rear corners.

3. Pull back from the Readout board (A62) to remove.

To replace, reverse the procedure. Be careful not to bend any pins on the Readout board (A62).

**Replacing the Readout Board (A62) (See Fig. 5-14)**

1. Remove the Readout Driver board (A61).

2. Remove the two shouldered spacer posts, using a 3/16-inch Hex driver.

3. Remove the Readout board.

To replace, reverse the procedure.

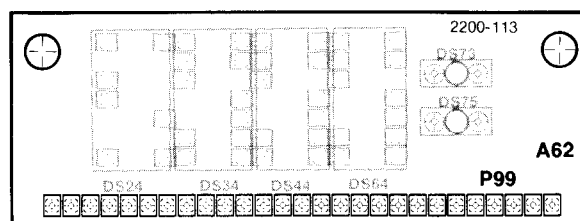


Fig. 5-14. Replacing the Readout Board (A62).

### Replacing the AGC Control Board (A60) (See Fig. 5-15)

1. Remove the Readout Driver board (A61).
2. Remove all harmonica connectors on A60, except P01, P31, and P75, which are already disconnected from A61.
3. Remove the screws from the four corners, and the spacer posts from the center slides, using a 3/16-inch Hex driver.

4. Pull back until the switch pushbuttons clear the front panel, and remove the board.

To replace, reverse the procedure.

### Replacing the Audio Interface Board (A44) (See Fig. 5-16)

1. Remove all connectors.
2. Remove the eight screws holding the board.
3. Remove the board by pulling it back from the front panel to clear the switches.

To replace, reverse the procedure.

### Replacing the Power Supply Board (A70) (See Fig. 5-17)

1. Remove all harmonica connectors.

2. Remove the four Allen screws (7/64-inch head) from the heat sink on the rear panel.
3. Remove the heat sink and power supply assembly from the rear panel.

**NOTE**

*If troubleshooting the Power Supply, connect a ground strap between P50 or the heat sink and chassis ground on the 1450-1, and reconnect P08, the power transformer secondaries, to the board.*

4. Remove the screws from Q05, Q34, and Q95.

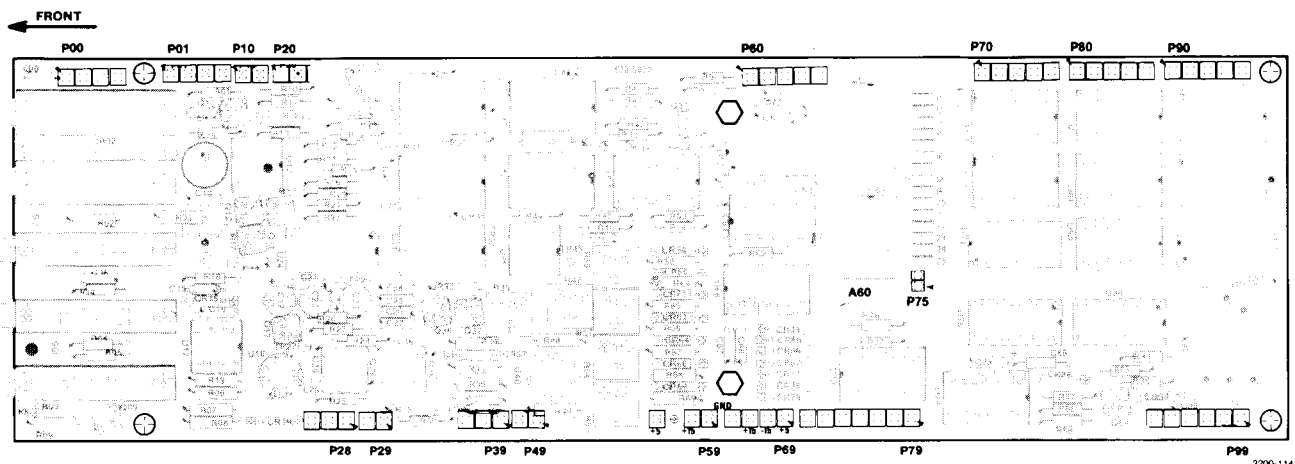
5. Remove the seven screws holding the Power Supply board.

6. Remove the board from the heat sink.

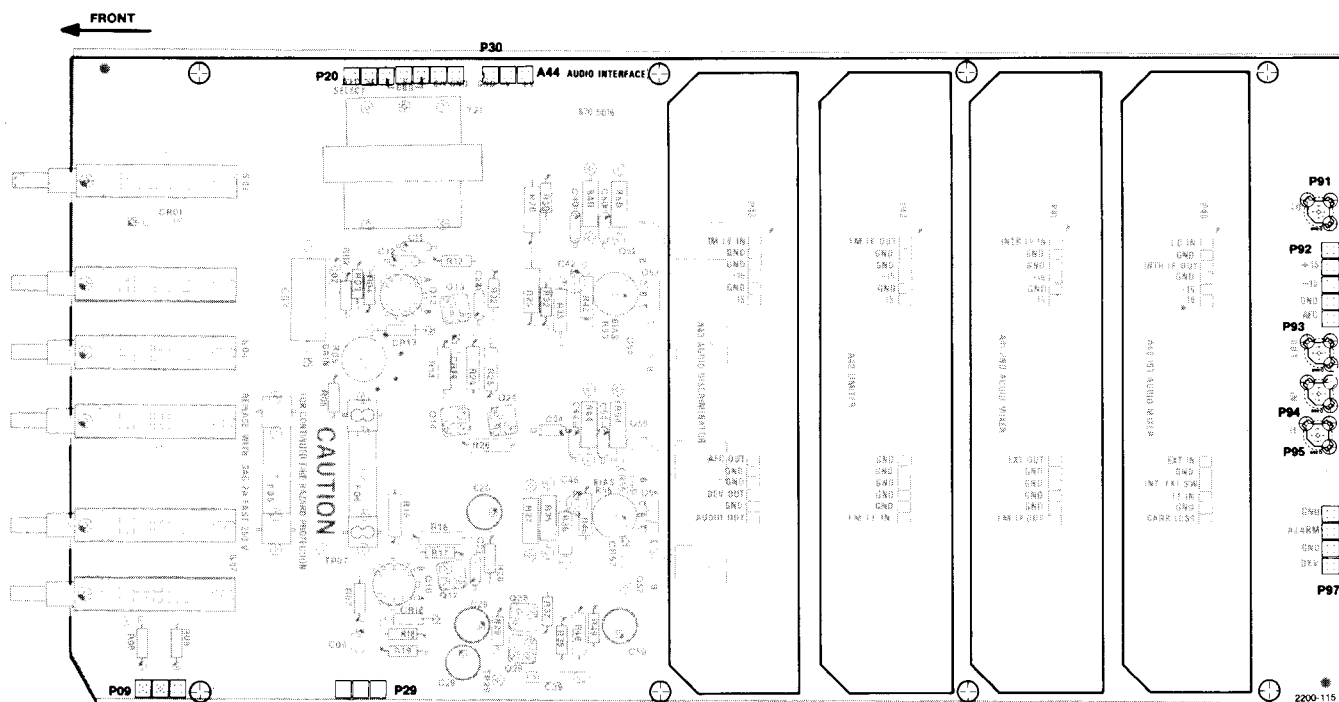
When replacing the Power Supply board, be sure to replace the mica insulating washers between the power transistors and the heat sink. Check that the transistors and heat sink have adequate thermal-conducting grease for proper thermal conduction.

**WARNING**

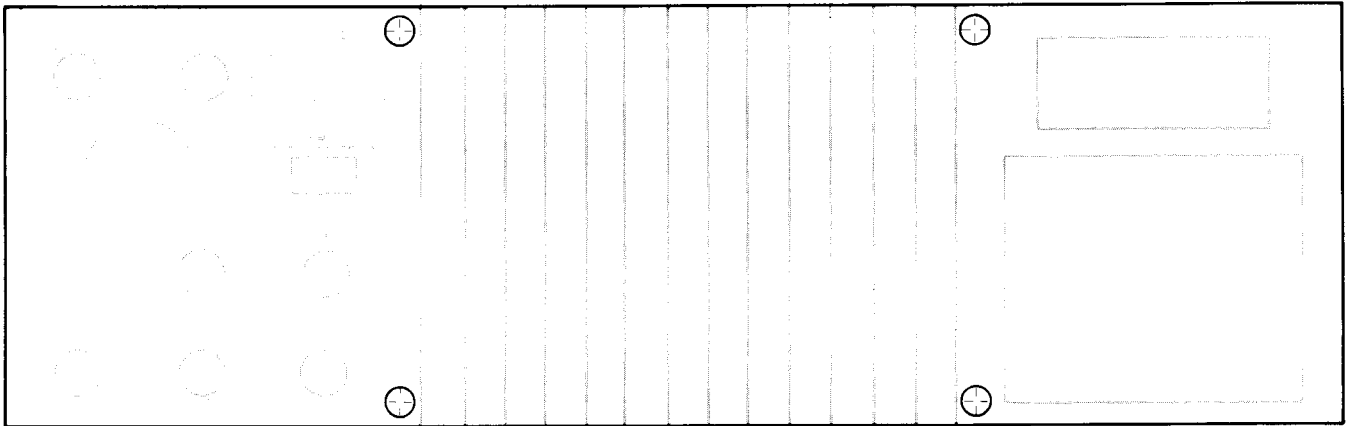
*Handle grease with care. Avoid getting grease in the eyes. Wash hands thoroughly after use.*



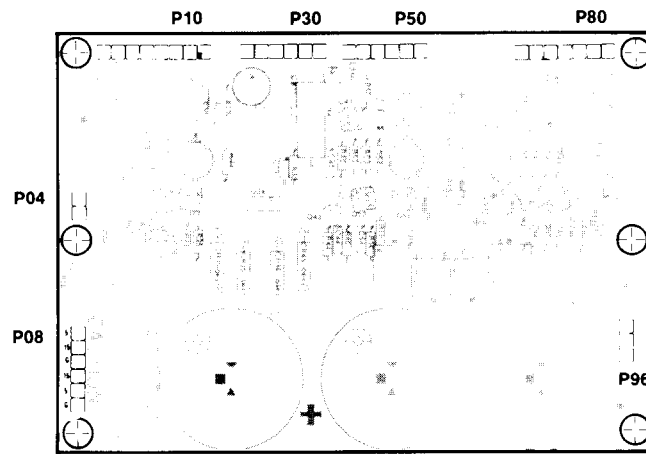
**Fig. 5-15. Replacing the AGC Control Board (A60).**



**Fig. 5-16. Replacing the Audio Interface Board (A44).**



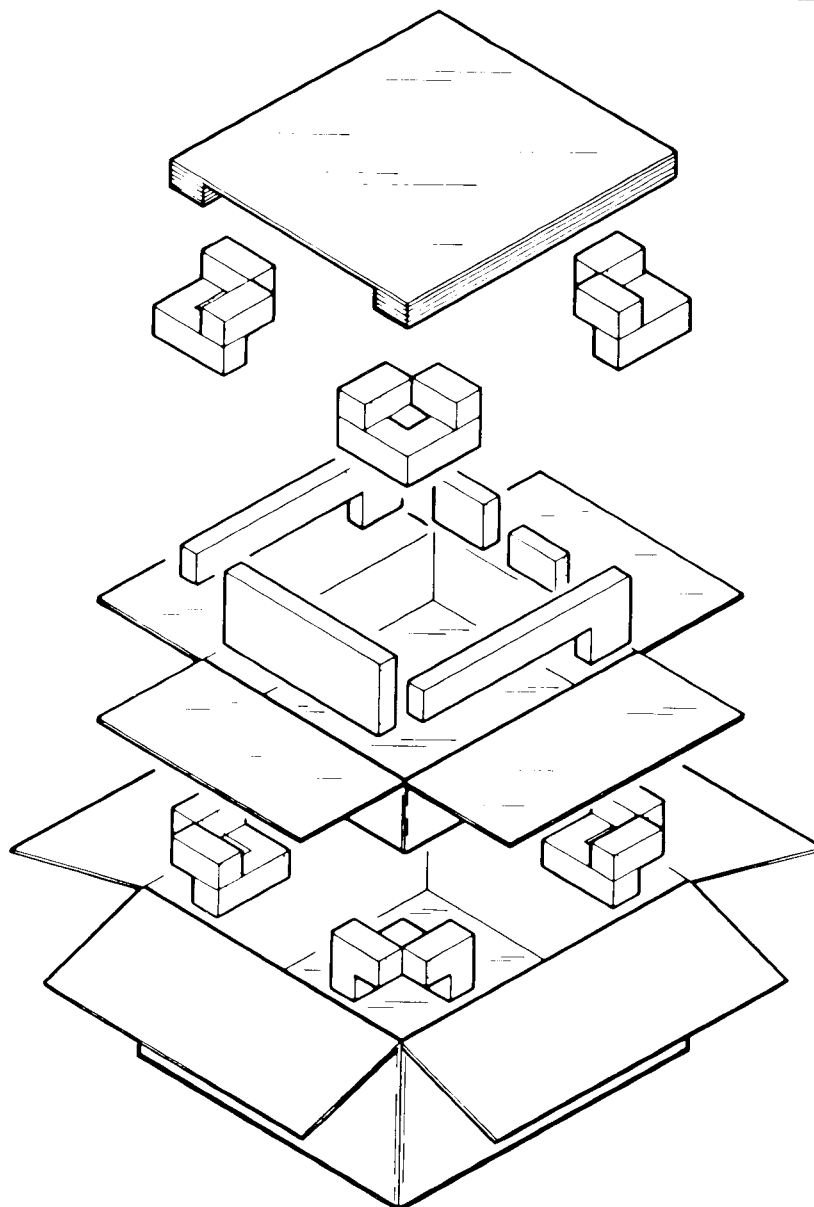
(a) Rear view of instrument.



(b)

2200-116

Fig. 5-17. Replacing the Power Supply Board (A70).



#### Repackaging for Shipment:

If the Tektronix instrument is to be shipped to a Tektronix Service Center for service or repair, attach a tag showing: owner (with address) and the name of an individual at your firm that can be contacted, complete instrument serial number and a description of the service required.

Save and re-use the package in which your instrument was shipped. If the original packaging is unfit for use or not available, repackage the instrument as follows:

1. Obtain a carton of corrugated cardboard having inside dimensions of no less than six inches more than the instrument dimensions; this will allow for cushioning. Refer to Table 1 for carton test strength requirements.
2. Surround the instrument with polyethylene sheeting to protect the finish of the instrument.
3. Cushion the instrument on all sides by tightly packing dunnage or urethane foam between carton and instrument, allowing three inches on all sides.
4. Seal carton with shipping tape or industrial stapler.

Table 1  
Shipping Carton Test Strength

Gross Weight (lb.)	Carton Test Strength (lb.)
0 — 10	200
10 — 30	275
30 — 120	375
120 — 140	500
140 — 160	600

2200-117

Fig. 5-18. Repackaging Instructions.



## SECTION 6

# 1450-SERIES OPTIONS

### Introduction

The demodulator mainframe described in this manual is compatible with the CCIR System denoted by the suffix (dash-number) in the title according to Table 6-1. Each demodulator mainframe is equipped with an identification tag that includes system identification and visual *if*.

Table 6-1  
VISUAL IF OPTIONS

Mainframe	Option	Visual
1450-X*	01†	37.00 MHz
1450-X*	02	38.90 MHz
1450-X*	03†	45.75 MHz

\*The letter X is replaced by a number denoting the CCIR System. For System M, the number is 1; for System B and G the number is 2; and for System I the number is 3.

†Not available for Systems B,G, and I.





# REPLACEABLE ELECTRICAL PARTS

## PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

### LIST OF ASSEMBLIES

A list of assemblies can be found at the beginning of the Electrical Parts List. The assemblies are listed in numerical order. When the complete component number of a part is known, this list will identify the assembly in which the part is located.

### CROSS INDEX-MFR. CODE NUMBER TO MANUFACTURER

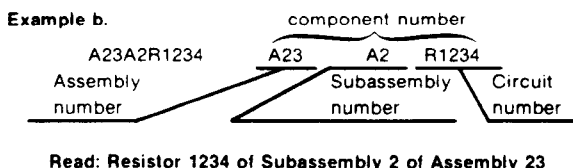
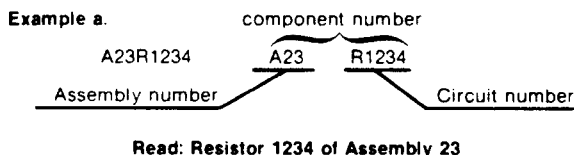
The Mfr. Code Number to Manufacturer index for the Electrical Parts List is located immediately after this page. The Cross Index provides codes, names and addresses of manufacturers of components listed in the Electrical Parts List.

### ABBREVIATIONS

Abbreviations conform to American National Standard Y1.1

### COMPONENT NUMBER (column one of the Electrical Parts List)

A numbering method has been used to identify assemblies, subassemblies and parts. Examples of this numbering method and typical expansions are illustrated by the following.



Only the circuit number will appear on the diagrams and circuit board illustrations. Each diagram and circuit board illustration is clearly marked with the assembly number. Assembly numbers are also marked on the mechanical exploded views located in the Mechanical Parts List. The component number is obtained by adding the assembly number prefix to the circuit number.

The Electrical Parts List is divided and arranged by assemblies in numerical sequence (e.g., assembly A1 with its subassemblies and parts, precedes assembly A2 with its subassemblies and parts).

Chassis-mounted parts have no assembly number prefix and are located at the end of the Electrical Parts List.

### TEKTRONIX PART NO. (column two of the Electrical Parts List)

Indicates part number to be used when ordering replacement part from Tektronix.

### SERIAL/MODEL NO. (columns three and four of the Electrical Parts List)

Column three (3) indicates the serial number at which the part was first used. Column four (4) indicates the serial number at which the part was removed. No serial number entered indicates part is good for all serial numbers.

### NAME & DESCRIPTION (column five of the Electrical Parts List)

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

### MFR. CODE (column six of the Electrical Parts List)

Indicates the code number of the actual manufacturer of the part. (Code to name and address cross reference can be found immediately after this page.)

### MFR. PART NUMBER (column seven of the Electrical Parts List)

Indicates actual manufacturers part number.

## CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
00779	AMP INC	2800 FULLING MILL PO BOX 3608	HARRISBURG PA 17105
00853	SANGAMO WESTON INC COMPONENTS DIV	SANGAMO RD PO BOX 128	PICKENS SC 29671-9716
01121	ALLEN-BRADLEY CO	1201 S 2ND ST	MILWAUKEE WI 53204-2410
01295	TEXAS INSTRUMENTS INC SEMICONDUCTOR GROUP	13500 N CENTRAL EXPY PO BOX 655012	DALLAS TX 75265
01686	RCL ELECTRONICS/SHALLCROSS INC SUB OF HIRSCH AND ASSOCIATES INC	195 MCGREGOR ST	MANCHESTER NH 03102-3731
02735	RCA CORP SOLID STATE DIVISION		
02777	HOPKINS ENGINEERING CO	12900 FOOTHILL BLVD	SAN FERNANDO CA 91342-4928
04222	AVX CERAMICS DIV OF AVX CORP	19TH AVE SOUTH P O BOX 867	MYRTLE BEACH SC 29577
04713	MOTOROLA INC SEMICONDUCTOR PRODUCTS SECTOR	5005 E MCDOWELL RD	PHOENIX AZ 85008-4229
05397	UNION CARBIDE CORP MATERIALS SYSTEMS DIV	11901 MADISON AVE	CLEVELAND OH 44101
05464	INDUSTRIAL ELECTRONIC ENGINEERS INC	7440 LEMONA AVE	VAN NUYS CA 91405-1136
05828	GENERAL INSTRUMENT CORP GOVERNMENT SYSTEMS DIV	600 W JOHN ST	HICKSVILLE NY 11802
07088	KELVIN ELECTRIC CO	5907 NOBLE AVE	VAN NUYS CA 91411
07716	TRW INC TRW IRC FIXED RESISTORS/BURLINGTON	2850 MT PLEASANT AVE	BURLINGTON IA 52601
15605	EATON CORP OPERATIONS AND TECHNICAL CTR	4201 N 27TH ST	MILWAUKEE WI 53216-1807
18324	SIGNETICS CORP MILITARY PRODUCTS DIV	4130 S MARKET COURT	SACRAMENTO CA 95834-1222
19396	ILLINOIS TOOL WORKS INC PAKTRON DIV	1205 MCCONVILLE RD PO BOX 4539	LYNCHBURG VA 24502-4535
19701	PHILIPS COMPONENTS DISCRETE PRODUCTS DIV RESISTIVE PRODUCTS FACILITY	PO BOX 760	MINERAL WELLS TX 76067-0760
24165	SPRAGUE ELECTRIC CO	267 LOWELL ROAD	HUDSON NH 03051
24546	CORNING GLASS WORKS	550 HIGH ST	BRADFORD PA 16701-3737
25088	SIEMENS CORP	186 WOOD AVE S	ISELIN NJ 08830-2704
27014	NATIONAL SEMICONDUCTOR CORP	2900 SEMICONDUCTOR DR	SANTA CLARA CA 95051-0606
28733	CERAMIC MAGNETICS INC	87 FAIRFIELD RD	FAIRFIELD NJ 07006-4732
31781	EDAC INC	20 RAILSIDE RD	DON MILLS ONT CAN M3A 1A4
32997	BOURNS INC TRIMPOT DIV	1200 COLUMBIA AVE	RIVERSIDE CA 92507-2114
33095	SPECTRUM CONTROL INC	2185 W WEIGHT ST	ERIE PA 16505
33096	COLORADO CRYSTAL CORP	2303 W 8TH ST	LOVELAND CO 80537-5268
50579	SIEMENS COMPONENTS INC OPTOELECTRONICS DIV	19000 HOMESTEAD RD	CUPERTINO CA 95014-0712
51406	MURATA ERIE NORTH AMERICA INC HEADQUARTERS AND GEORGIA OPERATIONS	2200 LAKE PARK DR	SMYRNA GA 30080
51642	CENTRE ENGINEERING INC	2820 E COLLEGE AVE	STATE COLLEGE PA 16801-7515
52763	STETCO INC	3344 SCHIERHORN	FRANKLIN PARK IL 60131
54473	MATSUSHITA ELECTRIC CORP OF AMERICA	ONE PANASONIC WAY PO BOX 1501	SECAUCUS NJ 07094-2917
55680	NICHICON /AMERICA/ CORP	927 E STATE PKY	SCHAUMBURG IL 60195-4526
57668	ROHM CORP	8 WHATNEY PO BOX 19515	IRVINE CA 92713
58361	QUALITY TECHNOLOGIES CORP	3400 HILLVIEW AVE	PALO ALTO CA 94304-1319
59660	TUSONIX INC	7741 N BUSINESS PARK DR PO BOX 37144	TUCSON AZ 85740-7144
71400	BUSSMANN DIV OF COOPER INDUSTRIES INC	114 OLD STATE RD PO BOX 14460	ST LOUIS MO 63178
72982	ERIE SPECIALTY PRODUCTS INC	645 W 11TH ST	ERIE PA 16512
75042	IRC ELECTRONIC COMPONENTS PHILADELPHIA DIV	401 N BROAD ST	PHILADELPHIA PA 19108-1001
75915	TRW FIXED RESISTORS LITTELFUSE INC	800 E NORTHWEST HWY	DES PLAINES IL 60016-3049
76493	SUB TRACOR INC BELL INDUSTRIES INC JW MILLER DIV	19070 REYES AVE PO BOX 5825	COMPTON CA 90224-5825

## CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
76854	OAKGRIGSBY AN OAK INDUSTRIES INC CO	88 N DUGAN ROAD PO BOX 890	SUGAR GROVE IL 60544-0890
77342	AMF INC POTTER AND BRUMFIELD DIV	200 RICHLAND CREEK DR	PRINCETON IN 47670-4771
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077-0001
81073	GRAYHILL INC	561 HILLGROVE AVE PO BOX 10373	LA GRANGE IL 60525-5914
82389	SWITCHCRAFT INC SUB OF RAYTHEON CO	5555 N ELSTRON AVE	CHICAGO IL 60630-1314
91637	DALE ELECTRONICS INC	2064 12TH AVE PO BOX 609	COLUMBUS NE 68601-3632
S0545	NIPPON ELECTRIC CO LTD		TOKYO JAPAN
TK0040	TRIO-TECH RELIABILITY SERVICES	975 BENICIA AVE	SUNNYVALE CA 94086-2805
TK0858	STAUFFER SUPPLY CO (DIST)		
TK0961	NEC ELECTRONICS USA INC		
TK1134	TUSONIX INC	2155 N FORBES BLVD	TUCSON AZ 85705
TK1345	ZMAN & ASSOCIATES		
TK1468	LINEAR TECHNOLOGY CORP	1630 MCCARTHY BLVD	MILPITAS CA 95037
TK1483	TEKA PRODUCTS		
TK2042	ZMAN & ASSOCIATES	7633 S 180TH	KENT WA 98032

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A1	119-0948-00	B020000	B021043	ATTENUATOR,VAR:0-30DB IN 10DB STEPS	80009	119-0948-00
A1	119-0948-01	B021044		ATTENUATOR,VAR:0-30DB IN 10DB STEPS	80009	119-0948-01
A10	119-0813-00			SELECTOR,LINE V:W/LINE FLTR,RCPT & FUSE	02777	F65003
A20	670-5001-07			CIRCUIT BD ASSY:IF FILTER AMPL (OPTION 03 ONLY)	80009	670-5001-07
A20	670-5001-08			CIRCUIT BD ASSY:IF FILTER AMPL (OPTION 01 ONLY)	80009	670-5001-08
A20	670-5001-09			CKT BD SUBASSY:IF FILTER AMPL (OPTION 02 ONLY)	80009	670-5001-09
A21	-----			CKT BOARD ASSY:IF ATTENUATOR/AMP (PART OF A80,OPTION 03 ONLY)		
A22	-----			CKT BOARD ASSY:IF MIXER (PART OF A82,OPTION 01,02 & 03)		
A23	670-5003-01			CIRCUIT BD ASSY:IF SWITCH AURAL DRIVE	80009	670-5003-01
A24	670-5004-07			CIRCUIT BD ASSY:IF SAW AMPL	80009	670-5004-07
A25	670-5004-06			CIRCUIT BD ASSY:IF SAW AMPL	80009	670-5004-06
A26	670-6667-02	B020000	B020793	CIRCUIT BD ASSY:IF POST AMP	80009	670-6667-02
A26	670-6667-04	B020794		CIRCUIT BD ASSY:IF POST AMP	80009	670-6667-04
A27	670-5008-00	B020000	B020839	CIRCUIT BD ASSY:IF ZERO CARRIER/PH SHIFTER	80009	670-5008-00
A27	670-5008-01	B020840		CIRCUIT BD ASSY:IF ZERO CARRIER/PH SHIFTER	80009	670-5008-01
A28	670-5009-02			CIRCUIT BD ASSY:IF DET/VIDEO AMPL	80009	670-5009-02
A29	670-5009-02			CIRCUIT BD ASSY:IF DET/VIDEO AMPL	80009	670-5009-02
A30	-----			CKT BOARD ASSY:PIN DRIVER/IF ATTEN AMP (PART OF A80,OPTION 03)		
A30	151-0219-00			CKT BOARD ASSY:PIN DRIVER/IF ATTEN/MIXER (PART OF A82 OPTION 01,02 & 03)	80009	151-0219-00
A30	151-0219-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A31	-----			CKT BOARD ASSY:PIN DRIVER/IF ATTEN/MIXER (PART OF A82 OPTION 01,02 & 03)		
A31	151-0219-00			CKT BOARD ASSY:PIN DRIVER/IF ATTEN AMP (PART OF A80)	80009	151-0219-00
A31	151-0219-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A32	670-5010-01			CIRCUIT BD ASSY:IF INTERFACE	80009	670-5010-01
A40	670-5011-01			CIRCUIT BD ASSY:1ST AUDIO MIXER	80009	670-5011-01
A41	670-5012-04			CIRCUIT BD ASSY:SECOND AUDIO MIXER	80009	670-5012-04
A42	670-5013-02			CIRCUIT BD ASSY:AUDIO LIMITER	80009	670-5013-02
A43	670-7249-01			CIRCUIT BD ASSY:AUDIO DISCRIMINATOR	80009	670-7249-01
A44	670-8896-01	B020000	B020117	CIRCUIT BD ASSY:AUDIO INTFC	80009	670-8896-01
A44	670-8896-02	B020118		CIRCUIT BD ASSY:AUDIO,INTERFACE	80009	670-8896-02
A45	670-9069-00			CIRCUIT BD ASSY:Q-P FILTER/AMP	80009	670-9069-00
A46	670-5007-00			CIRCUIT BD ASSY:IF LIMITER	80009	670-5007-00
A50	670-5016-01			CIRCUIT BD ASSY:REF CONTROL	80009	670-5016-01
A51	670-5018-00			CIRCUIT BD ASSY:REF OSCILLATOR	80009	670-5018-00
A52	670-5017-00			CIRCUIT BD ASSY:PHASE SHIFTER	80009	670-5017-00
A53	322-3243-00			RES,FXD,FILM:3.32K OHM,1%,0.2W,TC=TO	91637	CCF50-1-G33200F
A53	670-5019-00			CIRCUIT BD ASSY:CONVERTER PHASE LOCK	80009	670-5019-00
A54	670-5020-00			CIRCUIT BD ASSY:DETECTOR LO SWITCH	80009	670-5020-00
A55	311-1280-00			RES,VAR,NONWW:TRMR,1K OHM,0.5W	80009	311-1280-00
A55	670-5007-00			CIRCUIT BD ASSY:IF LIMITER	80009	670-5007-00
A56	670-5194-07			CIRCUIT BD ASSY:CONVERTER CONTROL (OPTION 03 ONLY)	80009	670-5194-07
A56	670-5194-01	B020000	B020233	CIRCUIT BD ASSY:CONVERTER CONTROL	80009	670-5194-01
A56	670-5194-08	B020234		CIRCUIT BD ASSY:CONVERTER CONTROL (OPTION 01 ONLY)	80009	670-5194-08
A56	670-5194-02	B020000	B020233	CIRCUIT BD ASSY:CONVERTER CONTROL	80009	670-5194-02
A56	670-5194-09	B020234		CKT BD SUBASSY:CONVERTER CONTROL (OPTION 02 ONLY)	80009	670-5194-09
A57	670-5196-07			CIRCUIT BD ASSY:CONVERTER OSC (OPTION 01 & 02)	80009	670-5196-07

Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A57	670-5196-06		CIRCUIT BD ASSY:CONVERTER OSC (OPTION 03 ONLY)	80009	670-5196-06
A58	670-5195-00		CIRCUIT BD ASSY:PHASE LOCK SWITCH	80009	670-5195-00
A59	670-5021-01		CIRCUIT BD ASSY:PHASE LOCK INTERFACE	80009	670-5021-01
A60	670-5022-01	B020000	CIRCUIT BD ASSY:AGC LOGIC	80009	670-5022-01
A60	670-5022-03	B020555	CIRCUIT BD ASSY:AGC LOGIC	80009	670-5022-03
A60	670-5022-05	B020675	CIRCUIT BD ASSY:AGC LOGIC	80009	670-5022-05
A61	670-5023-01		CIRCUIT BD ASSY:READOUT DRIVER	80009	670-5023-01
A62	670-5024-00		CIRCUIT BD ASSY:READOUT	80009	670-5024-00
A70	670-4987-02	B020000	CIRCUIT BD ASSY:POWER SUPPLY	80009	670-4987-02
A70	670-4987-03	B020430	CIRCUIT BD ASSY:POWER SUPPLY	80009	670-4987-03
A70	670-4987-04	B021049	CIRCUIT BD ASSY:POWER SUPPLY	80009	670-4987-04
A80	672-0638-01	B020000	CIRCUIT BD ASSY:PIN DRIVER/IF ATTEN AMPL	80009	672-0638-01
A80	672-0638-03	B020430	CIRCUIT BD ASSY:PIN DRIVER	80009	672-0638-03
A82	672-0639-06		CIRCUIT BD ASSY:PIN DRVR/IF ATTEN/MIXER/FIL TER (OPTION 03 ONLY)	80009	672-0639-06
A82	672-0639-07		CIRCUIT BD ASSY:PIN DRVR/IF ATTEN/MIXER/FIL TER (OPTION 01 & 02)	80009	672-0639-07
A1	119-0948-00	B020000	ATTENUATOR,VAR:0-30DB IN 10DB STEPS	80009	119-0948-00
A1	119-0948-01	B021044	ATTENUATOR,VAR:0-30DB IN 10DB STEPS	80009	119-0948-01
A10	119-0813-00		SELECTOR,LINE V:W/LINE FLTR,RCPT & FUSE	02777	F65003
A20	670-5001-07		CIRCUIT BD ASSY:IF FILTER AMPL (OPTION 03 ONLY)	80009	670-5001-07
A20	670-5001-08		CIRCUIT BD ASSY:IF FILTER AMPL (OPTION 01 ONLY)	80009	670-5001-08
A20	670-5001-09		CKT BD SUBASSY:IF FILTER AMPL (OPTION 02 ONLY)	80009	670-5001-09
A20C5	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A20C13	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A20C14	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A20C15	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A20C19	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A20C20	283-0600-00		CAP,FXD,MICA DI:43PF,5%,500V (OPTION 03 ONLY)	80009	283-0600-00
A20C20	283-0633-00		CAP,FXD,MICA DI:77PF,1%,100V (OPTION 01 & 02)	80009	283-0633-00
A20C25	283-0638-00		CAP,FXD,MICA DI:130PF,1%,500V (OPTION 03 ONLY)	80009	283-0638-00
A20C25	283-0635-00		CAP,FXD,MICA DI:51PF,1%,500V (OPTION 01 ONLY)	80009	283-0635-00
A20C25	283-0647-00		CAP,FXD,MICA DI:70PF,1%,100V (OPTION 02 ONLY)	80009	283-0647-00
A20C26	281-0549-00		CAP,FXD,CER DI:68PF,10%,500V (OPTION 01 ONLY)	80009	281-0549-00
A20C26	281-0562-00		CAP,FXD,CER DI:39PF,10%,500V (OPTION 02 ONLY)	80009	281-0562-00
A20C28	283-0407-00		CAP,FXD,CER DI:27PF,5%,50V (OPTION 01 & 02)	04222	ULA105A270J8
A20C29	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A20C35	281-0167-00		CAP,VAR,CER DI:9-45PF,200V (OPTION 01,02 & 03)	33095	53-717-001 D9-45
A20C36	283-0600-00		CAP,FXD,MICA DI:43PF,5%,500V (OPTION 03 ONLY)	80009	283-0600-00
A20C36	283-0663-00		CAP,FXD,MICA DI:16.8PF,+/0.5PF,500V (OPTION 01 ONLY)	80009	283-0663-00
A20C36	283-0070-00		CAP,FXD,CER DI:30PF,10%,50V (OPTION 02 ONLY)	51642	200-050-NP0-300K
A20C37	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 02 & 03 ONLY)	80009	283-0111-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective Discont	Name & Description	Mfr. Code	Mfr. Part No.
A20C37	281-0562-00		CAP,FXD,CER DI:39PF,10%,500V (OPTION 01 ONLY)	80009	281-0562-00
A20C38	281-0564-00		CAP,FXD,CER DI:24PF,5%,500V (OPTION 02 ONLY)	80009	281-0564-00
A20C45	283-0640-00		CAP,FXD,MICA DI:160PF,1%,500V (OPTION 01 & 02)	80009	283-0640-00
A20C45	283-0638-00		CAP,FXD,MICA DI:130PF,1%,500V (OPTION 03 ONLY)	80009	283-0638-00
A20C53	281-0562-00		CAP,FXD,CER DI:39PF,10%,500V (OPTION 01 ONLY)	80009	281-0562-00
A20C53	281-0564-00		CAP,FXD,CER DI:24PF,5%,500V (OPTION 02 ONLY)	80009	281-0564-00
A20C54	283-0600-00		CAP,FXD,MICA DI:43PF,5%,500V (OPTION 03 ONLY)	80009	283-0600-00
A20C54	283-0663-00		CAP,FXD,MICA DI:16.8PF,+/-0.5PF,500V (OPTION 01 ONLY)	80009	283-0663-00
A20C54	283-0070-00		CAP,FXD,CER DI:30PF,10%,50V (OPTION 02 ONLY)	51642	200-050-NP0-300K
A20C55	281-0167-00		CAP,VAR,CER DI:9-45PF,200V (OPTION 01,02 & 03)	33095	53-717-001 D9-45
A20C58	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A20C59	290-0804-00		CAP,FXD,ELCTLT:10UF,+50-20%,25V	80009	290-0804-00
A20C65	283-0638-00		CAP,FXD,MICA DI:130PF,1%,500V (OPTION 01,02 & 03)	80009	283-0638-00
A20C66	283-0600-00		CAP,FXD,MICA DI:43PF,5%,500V (OPTION 03 ONLY)	80009	283-0600-00
A20C66	283-0639-00		CAP,FXD,MICA DI:56PF,1%,500V (OPTION 01 & 02)	80009	283-0639-00
A20C72	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A20C79	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A20C82	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A20C83	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A20C84	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A20C86	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A20C87	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A20CR28	152-0141-02		DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,D0-35,T&R	80009	152-0141-02
A20L2	108-0538-00		COIL,RF:FIXED,2.7UH	80009	108-0538-00
A20L22	114-0333-00		COIL,RF:VARIABLE,310-600NH (OPTION 01,02 & 03)	80009	114-0333-00
A20L26	108-0260-00		COIL,RF:FIXED,98NH	TK2042	ORDER BY DESC
A20L32	114-0352-00		COIL,RF:VARIABLE,220-400NH	80009	114-0352-00
A20L45	114-0302-00		COIL,RF:VARIABLE,140-290NH (OPTION 03 ONLY)	80009	114-0302-00
A20L45	114-0352-00		COIL,RF:VARIABLE,220-400NH (OPTION 01 & 02)	80009	114-0352-00
A20L52	114-0333-00		COIL,RF:VARIABLE,310-600NH	80009	114-0333-00
A20L62	114-0333-00		COIL,RF:VARIABLE,310-600NH (OPTION 01,02 & 03)	80009	114-0333-00
A20L99	108-0538-00		COIL,RF:FIXED,2.7UH	80009	108-0538-00
A20LR13	108-0212-00		COIL,RF:FIXED,495NH	80009	108-0212-00
A20LR86	108-0212-00		COIL,RF:FIXED,495NH	80009	108-0212-00
A20Q4	151-0451-00		TRANSISTOR:NPN,SI,TO-39 (OPTION 01,02 & 03)	80009	151-0451-00
A20Q16	151-0650-00		TRANSISTOR:NPN,SI,TO-39	S0545	2SC1252
A20Q47	151-0195-00		TRANSISTOR:SELECTED	80009	151-0195-00
A20Q72	151-0650-00		TRANSISTOR:NPN,SI,TO-39	S0545	2SC1252
A20Q85	151-0451-00		TRANSISTOR:NPN,SI,TO-39 (OPTION 01,02 & 03)	80009	151-0451-00
A20R2	321-0136-00		RES,FXD,FILM:255 OHM,1%,0.125W,TC=TO	07716	CEAD255R0F
A20R3	321-0155-00		RES,FXD,FILM:402 OHM,1%,0.125W,TC=TO	07716	CEAD402R0F

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A20R6	321-0080-00		RES,FXD,FILM:66.5 OHM,1%,0.125W,TC=TO	80009	321-0080-00
A20R7	-----		(TEST SELECTED)		
A20R8	315-0241-00		RES,FXD,FILM:240 OHM,5%,0.25W	80009	315-0241-00
A20R14	315-0200-00		RES,FXD,FILM:20 OHM,5%,0.25W	80009	315-0200-00
A20R15	315-0200-00		RES,FXD,FILM:20 OHM,5%,0.25W	80009	315-0200-00
A20R26	322-3097-00		RES,FXD,FILM:100 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 100E
A20R28	317-0510-00		RES,FXD,CMPSN:51 OHM,5%,0.125W (OPTION 01,02 & 03)	80009	317-0510-00
A20R36	315-0302-00		RES,FXD,FILM:3K OHM,5%,0.25W	80009	315-0302-00
A20R48	322-3308-00		RES,FXD,FILM:15.8K OHM,1%,0.2W,TC=TO	80009	322-3308-00
A20R49	321-0358-00		RES,FXD,FILM:52.3K OHM,1%,0.125W,TC=TO	07716	CEAD52301F
A20R57	315-0102-00		RES,FXD,FILM:1K OHM,5%,0.25W (OPTION 01,02 & 03)	80009	315-0102-00
A20R66	321-0136-00		RES,FXD,FILM:255 OHM,1%,0.125W,TC=TO	07716	CEAD255R0F
A20R71	321-0136-00		RES,FXD,FILM:255 OHM,1%,0.125W,TC=TO	07716	CEAD255R0F
A20R73	322-3030-00		RES,FXD,FILM:20 OHM,1%,0.2W,TC=TO	80009	322-3030-00
A20R74	322-3097-00		RES,FXD,FILM:100 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 100E
A20R75	315-0200-00		RES,FXD,FILM:20 OHM,5%,0.25W	80009	315-0200-00
A20R76	315-0200-00		RES,FXD,FILM:20 OHM,5%,0.25W	80009	315-0200-00
A20R83	321-0068-00		RES,FXD,FILM:49.9 OHM,0.1%,0.125W,TC=TO	80009	321-0068-00
A20R85	321-0080-00		RES,FXD,FILM:66.5 OHM,1%,0.125W,TC=TO	80009	321-0080-00
A20R92	315-0241-00		RES,FXD,FILM:240 OHM,5%,0.25W	80009	315-0241-00
A20R98	321-0155-00		RES,FXD,FILM:402 OHM,1%,0.125W,TC=TO	07716	CEAD402R0F
A20R99	321-0136-00		RES,FXD,FILM:255 OHM,1%,0.125W,TC=TO	07716	CEAD255R0F
A20RT12	307-0250-00		RES,THERMAL:390 OHM,10%,0.125W	80009	307-0250-00
A20RT97	307-0250-00		RES,THERMAL:390 OHM,10%,0.125W	80009	307-0250-00
A20T11	120-1159-00		TRANSFORMER,RF:TOROID	80009	120-1159-00
A20T18	120-1158-00		TRANSFORMER,RF:BALUN	80009	120-1158-00
A20T72	120-1158-00		TRANSFORMER,RF:BALUN	80009	120-1158-00
A20T89	120-1159-00		TRANSFORMER,RF:TOROID	80009	120-1159-00
A21	-----		CKT BOARD ASSY:IF ATTENUATOR/AMP (PART OF A80,OPTION 03 ONLY)		
A21C13	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A21C27	283-0111-00	B020430	CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A21C28	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A21C29	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A21C34	281-0613-00		CAP,FXD,CER DI:10PF,1%,500V	80009	281-0613-00
A21C37	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A21C43	283-0067-00		CAP,FXD,CER DI:0.001UF,10%,200V	51406	
A21C44	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A21C51	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A21C52	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A21C57	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A21C58	290-0782-00		CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A21C59	290-0782-00		CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A21C65	281-0658-00		CAP,FXD,CER DI:6.2PF,+/-0.25PF,500	80009	281-0658-00
A21C66	283-0032-00		CAP,FXD,CER DI:470PF,5%,500V	80009	283-0032-00
A21C67	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A21C68	283-0203-00		CAP,FXD,CER DI:0.47UF,20%,50V	05397	C330C474M5U1CA
A21C72	283-0663-00		CAP,FXD,MICA DI:16.8PF,+0.5PF,500V	80009	283-0663-00
A21C73	283-0203-00		CAP,FXD,CER DI:0.47UF,20%,50V	05397	C330C474M5U1CA
A21C74	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A21C76	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A21C85	281-0577-00		CAP,FXD,CER DI:14PF,5%,500V	80009	281-0577-00
A21C86	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A21C87	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A21C89	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A21C95	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A21C97	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A21C98	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A21CR14	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A21CR86	152-0579-00	B020000	B020775	SEMICON DVC,DI:SW,SI,100V,2.5A,A196P	80009	152-0579-00
A21CR86	152-0579-01	B020776		SEMICON DVC,DI:PIN,SI,100V,2.5 OHM,0.4PF	80009	152-0579-01
A21CR96	152-0579-00	B020000	B020775	SEMICON DVC,DI:SW,SI,100V,2.5A,A196P	80009	152-0579-00
A21CR96	152-0579-01	B020776		SEMICON DVC,DI:PIN,SI,100V,2.5 OHM,0.4PF	80009	152-0579-01
A21CR98	152-0579-00	B020000	B020775	SEMICON DVC,DI:SW,SI,100V,2.5A,A196P	80009	152-0579-00
A21CR98	152-0579-01	B020776		SEMICON DVC,DI:PIN,SI,100V,2.5 OHM,0.4PF	80009	152-0579-01
A21E42	276-0543-00			SHLD BEAD,ELEK:FERRITE	80009	276-0543-00
A21L75	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A21L75	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A21L76	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A21L76	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A21L98	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A21L98	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A21Q31	151-0451-00			TRANSISTOR:NPN,SI,TO-39	80009	151-0451-00
A21Q42	151-0438-00			TRANSISTOR:PNP,SI,AMPLIFIER,625 MA	80009	151-0438-00
A21Q62	151-0223-00			TRANSISTOR,SIG:BIPOLAR,NPN;15V,500MA,SWITCH ING;MPS2369A,TO-92 EBC	80009	151-0223-00
A21Q75	151-0472-00			TRANSISTOR,SIG:BIPOLAR,NPN;14V,80MA,1.0GHZ, AMPLIFIER;NE41632B,TO-92 EBC	80009	151-0472-00
A21R12	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A21R21	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A21R26	305-0271-00			RES,FXD,CMPSN:270 OHM,5%,2W	80009	305-0271-00
A21R27	321-0068-00			RES,FXD,FILM:49.9 OHM,0.1%,0.125W,TC=TO	80009	321-0068-00
A21R31	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A21R34	315-0180-00			RES,FXD,FILM:18 OHM,5%,0.25W	80009	315-0180-00
A21R35	315-0181-00			RES,FXD,FILM:180 OHM,5%,0.25W	80009	315-0181-00
A21R43	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A21R44	315-0622-00			RES,FXD,FILM:6.2K OHM,5%,0.25W	80009	315-0622-00
A21R45	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A21R46	311-1501-00			RES,VAR,NONWW:TRMR,20 OHM,0.5W	32997	3386X-1-200
A21R51	311-1936-00			RES,VAR,NONWW:TRMR,50 OHM,20%,0.5W	32997	3386X-1-500
A21R52	315-0201-00			RES,FXD,FILM:200 OHM,5%,0.25W	80009	315-0201-00
A21R53	315-0200-00			RES,FXD,FILM:20 OHM,5%,0.25W	80009	315-0200-00
A21R54	322-3047-00			RES,FXD,FILM:30.1 OHM,1%,0.2W,TC=TO	57668	CRB20FXE16K5
A21R55	322-3051-00			RES,FXD,FILM:33.2 OHM,1%,0.2W,TC=TO	57668	CRB20FXE301K
A21R57	315-0430-00			RES,FXD,FILM:43 OHM,5%,0.25W	80009	315-0430-00
A21R61	323-0134-00			RES,FXD,FILM:243 OHM,1%,0.5W,TC=TO	80009	323-0134-00
A21R63	322-3097-00			RES,FXD,FILM:100 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 100E
A21R65	315-0162-00			RES,FXD,FILM:1.6K OHM,5%,0.25W	80009	315-0162-00
A21R72	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A21R73	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A21R74	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A21R84	321-0068-00			RES,FXD,FILM:49.9 OHM,0.1%,0.125W,TC=TO	80009	321-0068-00
A21R87	321-0068-00			RES,FXD,FILM:49.9 OHM,0.1%,0.125W,TC=TO	80009	321-0068-00
A21R97	321-0068-00			RES,FXD,FILM:49.9 OHM,0.1%,0.125W,TC=TO	80009	321-0068-00
A22	-----			CKT BOARD ASSY:IF MIXER (PART OF A82,OPTION 01,02 & 03)		
A22C1	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A22C2	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 01 & 02)	80009	283-0111-00
A22C4	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A22C5	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A22C6	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00



Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A22C7	283-0637-00		CAP,FXD,MICA DI:20PF,2.5%,500V	80009	283-0637-00
A22C8	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A22C9	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 03 ONLY)	80009	283-0111-00
A22C12	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 03 ONLY)	80009	283-0111-00
A22C14	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 03 ONLY)	80009	283-0111-00
A22C15	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A22C18	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A22C19	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A22C25	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 03 ONLY)	80009	283-0111-00
A22C25	283-0649-00		CAP,FXD,MICA DI:105PF,1%,500V (OPTION 01 & 02)	80009	283-0649-00
A22C26	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A22C27	281-0111-00		CAP,VAR,AIR DI:2-27PF,325V (OPTION 01 & 02)	80009	281-0111-00
A22C28	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 01 & 02)	80009	283-0111-00
A22C30	283-0643-00		CAP,FXD,MICA DI:22PF,0.5%,500V (OPTION 01 & 02)	80009	283-0643-00
A22C30	283-0781-00		CAP,FXD,MICA DI:27PF,5%,500V (OPTION 03 ONLY)	80009	283-0781-00
A22C33	-----		(OPTION 2 ONLY)		
A22C33	283-0649-00		CAP,FXD,MICA DI:105PF,1%,500V	80009	283-0649-00
A22C45	281-0093-00		CAP,VAR,CER DI:5.5-18PF,350V (OPTION 03 ONLY)	80009	281-0093-00
A22C46	283-0635-00		CAP,FXD,MICA DI:51PF,1%,500V (OPTION 01 & 02)	80009	283-0635-00
A22C46	283-0639-00		CAP,FXD,MICA DI:56PF,1%,500V (OPTION 03 ONLY)	80009	283-0639-00
A22C48	281-0167-00		CAP,VAR,CER DI:9-45PF,200V (OPTION 01 & 02)	33095	53-717-001 D9-45
A22C53	283-0066-00		CAP,FXD,CER DI:2.5PF,+/-0.5PF,200V (OPTION 01 & 02)	72982	8101-047CQJ259D
A22C53	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 03 ONLY)	80009	283-0111-00
A22C60	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 01 & 02)	80009	283-0111-00
A22C62	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 03 ONLY)	80009	283-0111-00
A22C63	281-0170-00		CAP,VAR,CER DI:1.25-3PF,100V (OPTION 01 & 02)	80009	281-0170-00
A22C67	290-0782-00		CAP,FXD,ELCTL:4.7UF,+75-20%,35VDC (OPTION 01 & 02)	55680	UVX1V4R7MAA
A22C67	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 03 ONLY)	80009	283-0111-00
A22C72	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A22C73	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A22C75	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 01 & 02)	80009	283-0111-00
A22C76	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 01 & 02)	80009	283-0111-00
A22C78	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 01 & 02)	80009	283-0111-00
A22C79	290-0782-00		CAP,FXD,ELCTL:4.7UF,+75-20%,35VDC (OPTION 03 ONLY)	55680	UVX1V4R7MAA
A22C81	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 03 ONLY)	80009	283-0111-00
A22C83	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 01 & 02)	80009	283-0111-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A22C91	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 01 & 02)	80009	283-0111-00
A22C94	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 03 ONLY)	80009	283-0111-00
A22C95	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 01 & 02)	80009	283-0111-00
A22C96	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V (OPTION 01 & 02)	80009	283-0111-00
A22CR08	152-0579-00	B020000	B020775	SEMICON DVC,DI:SW,SI,100V,2.5A,A196P	80009	152-0579-00
A22CR08	152-0579-01	B020776		SEMICON DVC,DI:PIN,SI,100V,2.5 OHM,0.4PF	80009	152-0579-01
A22CR09	152-0579-00	B020000	B020775	SEMICON DVC,DI:SW,SI,100V,2.5A,A196P	80009	152-0579-00
A22CR09	152-0579-01	B020776		SEMICON DVC,DI:PIN,SI,100V,2.5 OHM,0.4PF	80009	152-0579-01
A22CR17	152-0579-00	B020000	B020775	SEMICON DVC,DI:SW,SI,100V,2.5A,A196P	80009	152-0579-00
A22CR17	152-0579-01	B020776		SEMICON DVC,DI:PIN,SI,100V,2.5 OHM,0.4PF	80009	152-0579-01
A22CR56	152-0715-00			SEMICON DVC,DI:SCHOTTKY,SI,RING QUAD,M491G (OPTION 01,02 & 03)	80009	152-0715-00
A22CR56	153-0044-00			SEMICON DVC SE:SIGNAL,4 MTCH 152-0322-03	80009	153-0044-00
A22L4	108-0733-00			COIL,RF:FIXED,117NH	80009	108-0733-00
A22L8	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A22L8	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A22L15	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A22L15	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A22L17	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A22L17	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A22L31	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A22L31	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A22L33	114-0246-00			COIL,RF:VARIABLE,700-1100NH (OPTION 01 & 02)	80009	114-0246-00
A22L36	114-0289-00			COIL,RF:VARIABLE,150-350NH (OPTION 03 ONLY)	80009	114-0289-00
A22L36	114-0352-00			COIL,RF:VARIABLE,220-400NH (OPTION 01 & 02)	80009	114-0352-00
A22L43	114-0333-00			COIL,RF:VARIABLE,310-600NH (OPTION 03 ONLY)	80009	114-0333-00
A22L61	108-0311-00			COIL,RF:FIXED,150NH (OPTION 03 ONLY)	TK1345	108-0311-00
A22L70	108-0311-00			COIL,RF:FIXED,150NH (OPTION 01 & 02)	TK1345	108-0311-00
A22L97	108-0054-00			COIL,RF:	80009	108-0054-00
A22LR22	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00
A22LR86	108-0212-00			COIL,RF:FIXED,495NH (OPTION 01 & 02)	80009	108-0212-00
A22LR87	108-0212-00			COIL,RF:FIXED,495NH (OPTION 03 ONLY)	80009	108-0212-00
A22Q2	151-0650-00			TRANSISTOR:NPN,SI,TO-39	S0545	2SC1252
A22Q23	151-0472-00			TRANSISTOR,SIG:BIPOLAR,NPN;14V,80MA,1.0GHZ, AMPLIFIER;NE41632B,TO-92 EBC (OPTION 01 & 02)	80009	151-0472-00
A22Q23	151-0451-00			TRANSISTOR:NPN,SI,TO-39 (OPTION 03 ONLY)	80009	151-0451-00
A22Q71	151-0650-00			TRANSISTOR:NPN,SI,TO-39 (OPTION 03 ONLY)	S0545	2SC1252
A22Q81	151-0650-00			TRANSISTOR:NPN,SI,TO-39 (OPTION 01 & 02)	S0545	2SC1252
A22Q85	151-0472-00			TRANSISTOR,SIG:BIPOLAR,NPN;14V,80MA,1.0GHZ, AMPLIFIER;NE41632B,TO-92 EBC (OPTION 01 & 02)	80009	151-0472-00
A22Q85	151-0451-00			TRANSISTOR:NPN,SI,TO-39	80009	151-0451-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A22Q93	151-0195-00		(OPTION 03 ONLY) TRANSISTOR:SELECTED	80009	151-0195-00
A22R00	322-3097-00		RES,FXD,FILM:100 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 100E
A22R7	321-0068-00		RES,FXD,FILM:49.9 OHM,0.1%,0.125W,TC=T0	80009	321-0068-00
A22R11	321-0080-00		(OPTION 01 & 02) RES,FXD,FILM:66.5 OHM,1%,0.125W,TC=T0	80009	321-0080-00
A22R11	315-0200-00		(OPTION 01 & 02) RES,FXD,FILM:20 OHM,5%,0.25W	80009	315-0200-00
A22R12	321-0068-00		(OPTION 03 ONLY) RES,FXD,FILM:49.9 OHM,0.1%,0.125W,TC=T0	80009	321-0068-00
A22R14	315-0200-00		RES,FXD,FILM:20 OHM,5%,0.25W	80009	315-0200-00
A22R14	315-0241-00		(OPTION 01 & 02) RES,FXD,FILM:240 OHM,5%,0.25W	80009	315-0241-00
A22R15	315-0241-00		(OPTION 03 ONLY) RES,FXD,FILM:240 OHM,5%,0.25W	80009	315-0241-00
A22R16	315-0200-00		(OPTION 01 & 02) RES,FXD,FILM:20 OHM,5%,0.25W	80009	315-0200-00
A22R17	321-0068-00		(OPTION 01 & 02) RES,FXD,FILM:49.9 OHM,0.1%,0.125W,TC=T0	80009	321-0068-00
A22R19	321-0068-00		(OPTION 03 ONLY) RES,FXD,FILM:49.9 OHM,0.1%,0.125W,TC=T0	80009	321-0068-00
A22R20	321-0122-00		RES,FXD,FILM:182 OHM,1%,0.125W,TC=T0	80009	321-0122-00
A22R21	322-3210-00		RES,FXD,FILM:1.5K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K50
A22R24	321-0080-00		RES,FXD,FILM:66.5 OHM,1%,0.125W,TC=T0	80009	321-0080-00
A22R25	315-0200-00		(OPTION 03 ONLY) RES,FXD,FILM:20 OHM,5%,0.25W	80009	315-0200-00
A22R42	322-3001-00		(OPTION 03 ONLY) RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A22R43	322-3105-00		(OPTION 01 & 02) RES,FXD,FILM:121 OHM,1%,0.2W,TC=T0	80009	322-3105-00
A22R46	322-3001-00		RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A22R51	311-1501-00		(OPTION 01 & 02) RES,VAR,NONW:TRMR,20 OHM,0.5W	32997	3386X-1-200
A22R52	317-0100-00		(OPTION 01,02 & 03) RES,FXD,CMPSN:10 OHM,5%,0.125W	80009	317-0100-00
A22R53	317-0100-00		(OPTION 01,02 & 03) RES,FXD,CMPSN:10 OHM,5%,0.125W	80009	317-0100-00
A22R54	322-3001-00		(OPTION 01,02 & 03) RES,FXD,FILM:10 OHM,1%,0.2W,TC=T0	80009	322-3001-00
A22R55	322-3097-00		(OPTION 03 ONLY) RES,FXD,FILM:100 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 100E
A22R62	321-0115-00		RES,FXD,FILM:154 OHM,1%,0.125W,TC=T0	80009	321-0115-00
A22R72	315-0200-00		(OPTION 01 & 02) RES,FXD,FILM:20 OHM,5%,0.25W	80009	315-0200-00
A22R73	321-0080-00		(OPTION 03 ONLY) RES,FXD,FILM:66.5 OHM,1%,0.125W,TC=T0	80009	321-0080-00
A22R74	321-0607-00		(OPTION 03 ONLY) RES,FXD,FILM:80 OHM,1%,0.125W,TC=T0	80009	321-0607-00
A22R75	315-0241-00		(OPTION 01 & 02) RES,FXD,FILM:240 OHM,5%,0.25W	80009	315-0241-00
A22R76	321-0080-00		(OPTION 01 & 02) RES,FXD,FILM:66.5 OHM,1%,0.125W,TC=T0	80009	321-0080-00
A22R81	322-3097-00		RES,FXD,FILM:100 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 100E
A22R82	322-3308-00		RES,FXD,FILM:15.8K OHM,1%,0.2W,TC=T0	80009	322-3308-00
A22R83	315-0200-00		RES,FXD,FILM:20 OHM,5%,0.25W	80009	315-0200-00
A22R83	315-0302-00		(OPTION 01 & 02) RES,FXD,FILM:3K OHM,5%,0.25W	80009	315-0302-00
A22R84	315-0302-00		(OPTION 03 ONLY) RES,FXD,FILM:3K OHM,5%,0.25W	80009	315-0302-00
A22R84	315-0200-00		(OPTION 01 & 02) RES,FXD,FILM:20 OHM,5%,0.25W	80009	315-0200-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A22R85	315-0200-00		(OPTION 03 ONLY) RES,FXD,FILM:20 OHM,5%,0.25W (OPTION 01 & 02)	80009	315-0200-00
A22R87	322-3184-00		RES,FXD,FILM:806 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 806E
A22R88	321-0124-00		RES,FXD,FILM:191 OHM,1%,0.125W, TC=TO (OPTION 03 ONLY)	07716	CEAD191R0F
A22R90	315-0102-00		RES,FXD,FILM:1K OHM,5%,0.25W (OPTION 01,02 & 03)	80009	315-0102-00
A22R92	321-0358-00		RES,FXD,FILM:52.3K OHM,1%,0.125W,TC=TO	07716	CEAD52301F
A22R97	321-0124-00		RES,FXD,FILM:191 OHM,1%,0.125W, TC=TO (OPTION 01 & 02)	07716	CEAD191R0F
A22RT22	307-0250-00		RES,THERMAL:390 OHM,10%,0.125W	80009	307-0250-00
A22RT86	307-0250-00		RES,THERMAL:390 OHM,10%,0.125W	80009	307-0250-00
A22T4	120-1158-00		TRANSFORMER,RF: BALUN	80009	120-1158-00
A22T48	120-1157-00		TRANSFORMER,RF:TOROID (OPTION 03 ONLY)	80009	120-1157-00
A22T54	120-1157-00		TRANSFORMER,RF:TOROID	80009	120-1157-00
A22T58	120-1157-00		TRANSFORMER,RF:TOROID (OPTION 01 & 02)	80009	120-1157-00
A22T61	120-1158-00		TRANSFORMER,RF: BALUN (OPTION 03 ONLY)	80009	120-1158-00
A22T71	120-1158-00		TRANSFORMER,RF: BALUN (OPTION 01 & 02)	80009	120-1158-00
A22T71	120-1159-00		TRANSFORMER,RF:TOROID (OPTION 03 ONLY)	80009	120-1159-00
A22T76	120-1159-00		TRANSFORMER,RF:TOROID (OPTION 03 ONLY)	80009	120-1159-00
A22T78	120-1159-00		TRANSFORMER,RF:TOROID (OPTION 01 & 02)	80009	120-1159-00
A23	670-5003-01		CIRCUIT BD ASSY:IF SWITCH AURAL DRIVE	80009	670-5003-01
A23C11	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A23C15	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A23C22	283-0203-00		CAP,FXD,CER DI:0.47UF,20%,50V	05397	C330C474M5U1CA
A23C27	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A23C35	290-0782-00		CAP,FXD,ELCTL:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A23C40	283-0640-00		CAP,FXD,MICA DI:160PF,1%,500V	80009	283-0640-00
A23C41	281-0167-00		CAP,VAR,CER DI:9-45PF,200V	33095	53-717-001 D9-45
A23C42	283-0625-00		CAP,FXD,MICA DI:220PF,1%,500V	80009	283-0625-00
A23C43	283-0625-00		CAP,FXD,MICA DI:220PF,1%,500V	80009	283-0625-00
A23C44	281-0167-00		CAP,VAR,CER DI:9-45PF,200V	33095	53-717-001 D9-45
A23C46	283-0625-00		CAP,FXD,MICA DI:220PF,1%,500V	80009	283-0625-00
A23C47	283-0728-00		CAP,FXD,MICA DI:120PF,1%,500V	80009	283-0728-00
A23C48	281-0167-00		CAP,VAR,CER DI:9-45PF,200V	33095	53-717-001 D9-45
A23C64	283-0638-00		CAP,FXD,MICA DI:130PF,1%,500V	80009	283-0638-00
A23C65	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A23C66	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A23C71	283-0638-00		CAP,FXD,MICA DI:130PF,1%,500V	80009	283-0638-00
A23C75	283-0177-00		CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A23C84	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A23C89	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A23C93	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A23C99	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A23CR83	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A23CR84	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A23CR88	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A23CR94	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A23CR95	152-0141-02		DIODE, SIG: ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02
A23CR97	152-0141-02		DIODE, SIG: ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02
A23L36	120-0382-00		COIL, RF: 210UH, +28%-43%, 14 TURNS, TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A23L51	114-0266-00		COIL, RF: VARIABLE, 400-800NH	80009	114-0266-00
A23L54	114-0266-00		COIL, RF: VARIABLE, 400-800NH	80009	114-0266-00
A23L58	114-0266-00		COIL, RF: VARIABLE, 400-800NH	80009	114-0266-00
A23L61	114-0333-00		COIL, RF: VARIABLE, 310-600NH	80009	114-0333-00
A23L82	120-0382-00		COIL, RF: 210UH, +28%-43%, 14 TURNS, TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A23Q13	151-0472-00		TRANSISTOR, SIG: BIPOLAR, NPN; 14V, 80MA, 1.0GHZ, AMPLIFIER: NE41632B, TO-92 EBC	80009	151-0472-00
A23Q17	151-0333-00		TRANSISTOR, SIG: BIPOLAR, NPN; 15V, 50MA, 650MHZ, AMPLIFIER: MPS918/MPS3563, TO-92 EBC	80009	151-0333-00
A23R13	315-0202-00		RES, FXD, FILM: 2K OHM, 5%, 0.25W	80009	315-0202-00
A23R15	315-0101-00		RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A23R23	315-0622-00		RES, FXD, FILM: 6.2K OHM, 5%, 0.25W	80009	315-0622-00
A23R24	315-0102-00		RES, FXD, FILM: 1K OHM, 5%, 0.25W	80009	315-0102-00
A23R25	315-0430-00		RES, FXD, FILM: 43 OHM, 5%, 0.25W	80009	315-0430-00
A23R27	315-0121-00		RES, FXD, FILM: 120 OHM, 5%, 0.25W	80009	315-0121-00
A23R33	315-0430-00		RES, FXD, FILM: 43 OHM, 5%, 0.25W	80009	315-0430-00
A23R36	315-0470-00		RES, FXD, FILM: 47 OHM, 5%, 0.25W	80009	315-0470-00
A23R64	322-3130-00		RES, FXD, FILM: 221 OHM, 1%, 0.2W, TC=TO	80009	322-3130-00
A23R65	321-0037-00		RES, FXD, FILM: 23.7 OHM, 1%, 0.125W, TC=TO	80009	321-0037-00
A23R66	322-3130-00		RES, FXD, FILM: 221 OHM, 1%, 0.2W, TC=TO	80009	322-3130-00
A23R71	315-0102-00		RES, FXD, FILM: 1K OHM, 5%, 0.25W	80009	315-0102-00
A23R78	315-0101-00		RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A23R81	321-0099-00		RES, FXD, FILM: 105 OHM, 1%, 0.125W, TC=TO	07716	CEAD105R0F
A23R82	321-0006-00		RES, FXD, FILM: 11.3 OHM, 1%, 0.125W, TC=TO	24546	NA55D11R3F
A23R83	321-0006-00		RES, FXD, FILM: 11.3 OHM, 1%, 0.125W, TC=TO	24546	NA55D11R3F
A23R86	301-0511-00		RES, FXD, FILM: 510 OHM, 5%, 0.5W	19701	5053CX510RQJ
A23R87	315-0470-00		RES, FXD, FILM: 47 OHM, 5%, 0.25W	80009	315-0470-00
A23R96	301-0511-00		RES, FXD, FILM: 510 OHM, 5%, 0.5W	19701	5053CX510RQJ
A23R97	315-0470-00		RES, FXD, FILM: 47 OHM, 5%, 0.25W	80009	315-0470-00
A23T29	120-1155-00		TRANSFORMER, RF: TOROID	80009	120-1155-00
A24	670-5004-07		CIRCUIT BD ASSY: IF SAW AMPL	80009	670-5004-07
A24C54	283-0598-00		CAP, FXD, MICA DI: 253PF, 5%, 500V	80009	283-0598-00
A24C57	290-0804-00		CAP, FXD, ELCTLT: 10UF, +50-20%, 25V	80009	290-0804-00
A24C65	283-0111-00		CAP, FXD, CER DI: 0.1UF, 20%, 50V	80009	283-0111-00
A24C66	290-0804-00		CAP, FXD, ELCTLT: 10UF, +50-20%, 25V	80009	290-0804-00
A24C73	283-0111-00		CAP, FXD, CER DI: 0.1UF, 20%, 50V	80009	283-0111-00
A24C74	283-0111-00		CAP, FXD, CER DI: 0.1UF, 20%, 50V	80009	283-0111-00
A24C76	283-0111-00		CAP, FXD, CER DI: 0.1UF, 20%, 50V	80009	283-0111-00
A24C78	283-0111-00		CAP, FXD, CER DI: 0.1UF, 20%, 50V	80009	283-0111-00
A24C83	283-0111-00		CAP, FXD, CER DI: 0.1UF, 20%, 50V	80009	283-0111-00
A24C85	283-0203-00		CAP, FXD, CER DI: 0.47UF, 20%, 50V	05397	C330C474M5U1CA
A24C90	-----		(TEST SELECTED)		
A24C95	283-0203-00		CAP, FXD, CER DI: 0.47UF, 20%, 50V	05397	C330C474M5U1CA
A24C96	283-0636-00		CAP, FXD, MICA DI: 36PF, 1.4%, 500V	80009	283-0636-00
A24C98	283-0635-00		CAP, FXD, MICA DI: 51PF, 1%, 500V	80009	283-0635-00
A24C99	283-0111-00		CAP, FXD, CER DI: 0.1UF, 20%, 50V	80009	283-0111-00
A24CR18	152-0141-02		DIODE, SIG: ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02
A24CR78	152-0141-02		DIODE, SIG: ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02
A24FL23	155-0162-00		MICROCKT, LINEAR: SURFACE ACOUSTIC WAVE FLTR	80009	155-0162-00
A24L52	114-0288-00		COIL, RF: VARIABLE, 450-850NH	80009	114-0288-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A24L58	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A24L58	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A24L66	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A24L66	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A24L83	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A24L83	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A24Q71	151-0451-00			TRANSISTOR:NPN,SI,TO-39	80009	151-0451-00
A24Q82	151-0438-00			TRANSISTOR:PMP,SI,AMPLIFIER,625 MA	80009	151-0438-00
A24Q85	151-0223-00			TRANSISTOR,SIG:BIPOLAR,NPN;15V,500MA,SWITCH ING:MPS2369A,TO-92 EBC	80009	151-0223-00
A24Q97	151-0472-00			TRANSISTOR,SIG:BIPOLAR,NPN;14V,80MA,1.0GHZ, AMPLIFIER;NE41632B,TO-92 EBC	80009	151-0472-00
A24R63	305-0271-00			RES,FXD,CMPSN:270 OHM,5%,2W	80009	305-0271-00
A24R65	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A24R70	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A24R71	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A24R72	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A24R73	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A24R75	315-0622-00			RES,FXD,FILM:6.2K OHM,5%,0.25W	80009	315-0622-00
A24R76	315-0200-00			RES,FXD,FILM:20 OHM,5%,0.25W	80009	315-0200-00
A24R77	315-0200-00			RES,FXD,FILM:20 OHM,5%,0.25W	80009	315-0200-00
A24R79	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A24R81	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A24R83	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A24R85	322-3030-00			RES,FXD,FILM:20 OHM,1%,0.2W,TC=TO	80009	322-3030-00
A24R87	321-0068-00			RES,FXD,FILM:49.9 OHM,0.1%,0.125W,TC=TO	80009	321-0068-00
A24R88	315-0162-00			RES,FXD,FILM:1.6K OHM,5%,0.25W	80009	315-0162-00
A24R90	-----			(TEST SELECTED)		
A24R93	311-1936-00			RES,VAR,NONW:TRMR,50 OHM,20%,0.5W	32997	3386X-1-500
A24R96	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A24R97	322-3092-00			RES,FXD,FILM:88.7 OHM,1%,0.2W,TC=TO	80009	322-3092-00
A24R98	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A24T55	120-0487-00			XFMR,TOROID:	80009	120-0487-00
A25	670-5004-06			CIRCUIT BD ASSY:IF SAW AMPL	80009	670-5004-06
A25C54	283-0598-00			CAP,FXD,MICA DI:253PF,5%,500V	80009	283-0598-00
A25C57	290-0804-00			CAP,FXD,ELCTLT:10UF,+50-20%,25V	80009	290-0804-00
A25C65	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A25C66	290-0804-00			CAP,FXD,ELCTLT:10UF,+50-20%,25V	80009	290-0804-00
A25C73	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A25C74	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A25C76	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A25C78	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A25C83	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A25C85	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	05397	C330C474M5U1CA
A25C90	-----			(TEST SELECTED)		
A25C95	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	05397	C330C474M5U1CA
A25C96	283-0636-00			CAP,FXD,MICA DI:36PF,1.4%,500V	80009	283-0636-00
A25C98	283-0635-00			CAP,FXD,MICA DI:51PF,1%,500V	80009	283-0635-00
A25C99	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A25CR18	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A25CR78	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A25FL23	155-0163-00			MICROCKT,LINEAR:SURFACE ACOUSTIC WAVE FLTR	80009	155-0163-00
A25L52	114-0228-00			COIL,RF:VARIABLE,84-104NH	TK1345	114-0228-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A25L58	120-0382-00			COIL, RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A25L66	120-0382-00			COIL, RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A25L83	120-0382-00			COIL, RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A25Q71	151-0451-00			TRANSISTOR:NPN,SI,TO-39	80009	151-0451-00
A25Q82	151-0438-00			TRANSISTOR:PMP,SI,AMPLIFIER,625 MA	80009	151-0438-00
A25Q85	151-0223-00			TRANSISTOR,SIG:BIPOLAR,NPN;15V,500MA,SWITCH ING;MPS2369A,TO-92 EBC	80009	151-0223-00
A25Q97	151-0472-02			TRANSISTOR:NPN,SI,TO-92	80009	151-0472-02
A25R63	305-0271-00			RES,FXD,CMPSN:270 OHM,5%,2W	80009	305-0271-00
A25R65	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A25R70	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A25R71	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A25R72	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A25R73	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A25R75	315-0622-00			RES,FXD,FILM:6.2K OHM,5%,0.25W	80009	315-0622-00
A25R76	315-0200-00			RES,FXD,FILM:20 OHM,5%,0.25W	80009	315-0200-00
A25R77	315-0200-00			RES,FXD,FILM:20 OHM,5%,0.25W	80009	315-0200-00
A25R79	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A25R81	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A25R83	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A25R85	322-3030-00			RES,FXD,FILM:20 OHM,1%,0.2W,TC=TO	80009	322-3030-00
A25R87	321-0068-00			RES,FXD,FILM:49.9 OHM,0.1%,0.125W,TC=TO	80009	321-0068-00
A25R88	315-0162-00			RES,FXD,FILM:1.6K OHM,5%,0.25W	80009	315-0162-00
A25R90	-----			(TEST SELECTED)		
A25R93	311-1936-00			RES,VAR,NONWM:TRMR,50 OHM,20%,0.5W	32997	3386X-1-500
A25R96	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A25R97	322-3101-00			RES,FXD,FILM:110 OHM,1%,0.2W,TC=TO	91637	CCF50-2G110R0F
A25R98	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A25T55	120-0487-00			XFMR,TOROID:	80009	120-0487-00
A26	670-6667-02	B020000	B020793	CIRCUIT BD ASSY:IF POST AMP	80009	670-6667-02
A26	670-6667-04	B020794		CIRCUIT BD ASSY:IF POST AMP	80009	670-6667-04
A26C22	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A26C24	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A26C25	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A26C26	283-0594-00			CAP,FXD,MICA DI:0.001UF,1%,100V	80009	283-0594-00
A26C27	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A26C28	283-0666-00			CAP,FXD,MICA DI:890PF,2%,100V	80009	283-0666-00
A26C31	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A26C35	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	05397	C330C474M5U1CA
A26C37	283-0648-00			CAP,FXD,MICA DI:10PF,+/-0.5PF,500V	80009	283-0648-00
A26C43	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	05397	C330C474M5U1CA
A26C45	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A26C46	283-0635-00			CAP,FXD,MICA DI:51PF,1%,500V	80009	283-0635-00
A26C52	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A26C55	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A26C56	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A26C57	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A26C58	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A26C62	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A26C64	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A26C70	281-0097-00			CAP,VAR,AIR DI:9-35PF,200V	33095	53-717-029-D9-35
A26C72	281-0611-00			CAP,FXD,CER DI:2.7PF,+/-0.25PF,200V	52763	2RDPLZ007 2P70CC
A26C76	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A26C80	283-0636-00			CAP,FXD,MICA DI:36PF,1.4%,500V	80009	283-0636-00
A26C84	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A26C85	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A26C94	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A26CR56	152-0579-00			SEMICON DVC,DI:SW,SI,100V,2.5A,A196P	80009	152-0579-00
A26E13	276-0543-02			SHLD BEAD,ELEK:FERRITE	28733	ORDER BY DESCR
A26E23	276-0543-02			SHLD BEAD,ELEK:FERRITE	28733	ORDER BY DESCR
A26E24	276-0543-02	B020794		SHLD BEAD,ELEK:FERRITE	28733	ORDER BY DESCR
A26E25	276-0543-02	B020794		SHLD BEAD,ELEK:FERRITE	28733	ORDER BY DESCR
A26E33	276-0543-02			SHLD BEAD,ELEK:FERRITE	28733	ORDER BY DESCR
A26E71	276-0543-02			SHLD BEAD,ELEK:FERRITE	28733	ORDER BY DESCR
A26L56	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A26L56	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A26L58	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A26L58	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A26L72	108-0345-00			COIL,RF:FIXED,1.8MH	80009	108-0345-00
A26L78	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A26L78	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A26LR81	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00
A26Q13	151-0333-00			TRANSISTOR,SIG:BIPOLAR,NPN;15V,50MA,650MHZ, AMPLIFIER;MPS918/MPS3563,TO-92 EBC	80009	151-0333-00
A26Q23	151-0333-00			TRANSISTOR,SIG:BIPOLAR,NPN;15V,50MA,650MHZ, AMPLIFIER;MPS918/MPS3563,TO-92 EBC	80009	151-0333-00
A26Q33	151-0472-00			TRANSISTOR,SIG:BIPOLAR,NPN;14V,80MA,1.0GHZ, AMPLIFIER;NE41632B,TO-92 EBC	80009	151-0472-00
A26Q53	151-0333-00			TRANSISTOR,SIG:BIPOLAR,NPN;15V,50MA,650MHZ, AMPLIFIER;MPS918/MPS3563,TO-92 EBC	80009	151-0333-00
A26Q71	151-0438-00			TRANSISTOR:PNP,SI,AMPLIFIER,625 MA	80009	151-0438-00
A26Q81	151-0451-00			TRANSISTOR:NPN,SI,TO-39	80009	151-0451-00
A26R10	315-0682-00			RES,FXD,FILM:6.8K OHM,5%,0.25W	80009	315-0682-00
A26R11	315-0201-00			RES,FXD,FILM:200 OHM,5%,0.25W	80009	315-0201-00
A26R12	315-0132-00			RES,FXD,FILM:1.3K OHM,5%,0.25W	80009	315-0132-00
A26R15	307-0103-00			RES,FXD,CMPSN:2.7 OHM,5%,0.25W	80009	307-0103-00
A26R21	315-0181-00			RES,FXD,FILM:180 OHM,5%,0.25W	80009	315-0181-00
A26R22	315-0201-00			RES,FXD,FILM:200 OHM,5%,0.25W	80009	315-0201-00
A26R30	315-0822-00			RES,FXD,FILM:8.2K OHM,5%,0.25W	80009	315-0822-00
A26R31	315-0132-00			RES,FXD,FILM:1.3K OHM,5%,0.25W	80009	315-0132-00
A26R32	322-3089-00			RES,FXD,FILM:82.5 OHM,1%,0.2W,TC=TO	80009	322-3089-00
A26R34	307-0103-00			RES,FXD,CMPSN:2.7 OHM,5%,0.25W	80009	307-0103-00
A26R41	311-1936-00			RES,VAR,NONWV:TRMR,50 OHM,20%,0.5W	32997	3386X-1-500
A26R42	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A26R44	315-0162-00			RES,FXD,FILM:1.6K OHM,5%,0.25W	80009	315-0162-00
A26R45	315-0201-00			RES,FXD,FILM:200 OHM,5%,0.25W	80009	315-0201-00
A26R46	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A26R48	315-0301-00			RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A26R53	322-3030-00			RES,FXD,FILM:20 OHM,1%,0.2W,TC=TO	80009	322-3030-00
A26R54	315-0510-00			RES,FXD,FILM:51 OHM,5%,0.25W	80009	315-0510-00
A26R58	315-0152-00			RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A26R63	322-3147-00			RES,FXD,FILM:332 OHM,1%,0.2W,TC=TO	80009	322-3147-00
A26R64	131-0566-00			BUS,CONDUCTOR:DUMMY RES.0.094 OD X 0.225 L	24546	QMA 07
A26R65	315-0301-00			RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A26R66	315-0430-00			RES,FXD,FILM:43 OHM,5%,0.25W	80009	315-0430-00
A26R71	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A26R73	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A26R74	315-0622-00			RES,FXD,FILM:6.2K OHM,5%,0.25W	80009	315-0622-00
A26R75	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A26R80	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A26R85	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A26R87	321-0068-00			RES,FXD,FILM:49.9 OHM,0.1%,0.125W,TC=TO	80009	321-0068-00



Component No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A26R96	321-0068-00		RES,FXD,FILM:49.9 OHM,0.1%,0.125W,TC=TO	80009	321-0068-00
A26R97	305-0271-00		RES,FXD,CMPNSN:270 OHM,5%,2W	80009	305-0271-00
A27	670-5008-00	B020000	CIRCUIT BD ASSY:IF ZERO CARRIER/PH SHIFTER	80009	670-5008-00
A27	670-5008-01	B020840	CIRCUIT BD ASSY:IF ZERO CARRIER/PH SHIFTER	80009	670-5008-01
A27C3	283-0633-00		CAP,FXD,MICA DI:77PF,1%,100V	80009	283-0633-00
A27C10	281-0096-00		CAP,VAR,AIR DI:5.5-18PF,350V	80009	281-0096-00
A27C27	283-0598-00		CAP,FXD,MICA DI:253PF,5%,500V	80009	283-0598-00
A27C31	283-0598-00		CAP,FXD,MICA DI:253PF,5%,500V	80009	283-0598-00
A27C56	283-0644-00		CAP,FXD,MICA DI:150PF,1%,500V	80009	283-0644-00
A27C57	283-0177-00		CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A27C88	283-0668-00		CAP,FXD,MICA DI:184PF,1%,100V	80009	283-0668-00
A27C95	283-0706-00		CAP,FXD,MICA DI:91PF,1%,500V	80009	283-0706-00
A27CR53	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A27CR66	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A27CR74	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A27CR75	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A27CR84	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A27CR85	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A27L13	114-0220-00		COIL,RF:VARIABLE,1-3UH	80009	114-0220-00
A27L21	114-0333-00		COIL,RF:VARIABLE,310-600NH	80009	114-0333-00
A27L25	114-0333-00		COIL,RF:VARIABLE,310-600NH	80009	114-0333-00
A27L48	120-1143-00		TRANSFORMER,RF:VARIABLE	80009	120-1143-00
A27L89	108-0733-00		COIL,RF:FIXED,117NH	80009	108-0733-00
A27L98	120-1146-00		TRANSFORMER,RF:VARIABLE	80009	120-1146-00
A27Q58	151-0325-00		TRANSISTOR,SIG:BIPOLAR,PNP;15V,50MA,SWITCHING;2N5771,TO-92 EBC CASE	80009	151-0325-00
A27R33	322-3085-00		RES,FXD,FILM:75 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 75E0
A27R43	321-0071-00		RES,FXD,FILM:53.6 OHM,1%,0.125W,TC=TO	80009	321-0071-00
A27R44	322-3085-00		RES,FXD,FILM:75 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 75E0
A27R45	321-0022-00		RES,FXD,FILM:16.5 OHM,1%,0.125W,TC=TO	80009	321-0022-00
A27R55	315-0510-00		RES,FXD,FILM:51 OHM,5%,0.25W	80009	315-0510-00
A27R58	315-0102-00		RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A27R62	315-0330-00		RES,FXD,FILM:33 OHM,5%,0.25W	80009	315-0330-00
A27R66	315-0153-00		RES,FXD,FILM:15K OHM,5%,0.25W	80009	315-0153-00
A27R68	315-0102-00		RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A27R72	311-1423-00		RES,VAR,NONW:TRMR,20 OHM,0.5W	32997	3386F-1-200
A27R73	315-0220-00		RES,FXD,FILM:22 OHM,5%,0.25W	80009	315-0220-00
A27R75	315-0330-00		RES,FXD,FILM:33 OHM,5%,0.25W	80009	315-0330-00
A27R82	321-0007-00		RES,FXD,FILM:11.5 OHM,1%,0.125W,TC=TO	80009	321-0007-00
A27R83	322-3158-00		RES,FXD,FILM:432 OHM,1%,0.2W,TC=TO	80009	322-3158-00
A27R84	315-0330-00		RES,FXD,FILM:33 OHM,5%,0.25W	80009	315-0330-00
A27R94	322-3158-00		RES,FXD,FILM:432 OHM,1%,0.2W,TC=TO	80009	322-3158-00
A27T55	120-1156-00		TRANSFORMER,RF:TORROID	80009	120-1156-00
A27T65	120-1428-00		TRANSFORMER,RF:TORROID	80009	120-1428-00
A27T94	120-1156-00		TRANSFORMER,RF:TORROID	80009	120-1156-00
A28	670-5009-02		CIRCUIT BD ASSY:IF DET/VIDEO AMPL	80009	670-5009-02
A28C5	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A28C7	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A28C17	283-0635-00		CAP,FXD,MICA DI:51PF,1%,500V	80009	283-0635-00
A28C34	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A28C41	283-0630-00		CAP,FXD,MICA DI:110PF,1%,100V	80009	283-0630-00
A28C47	283-0599-00		CAP,FXD,MICA DI:98PF,5%,500V	80009	283-0599-00
A28C51	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A28C57	283-0663-00		CAP,FXD,MICA DI:16.8PF,+/-0.5PF,500V	80009	283-0663-00
A28C58	290-0804-00		CAP,FXD,ELCTLT:10UF,+50-20%,25V	80009	290-0804-00
A28C59	290-0804-00		CAP,FXD,ELCTLT:10UF,+50-20%,25V	80009	290-0804-00
A28C66	283-0620-00		CAP,FXD,MICA DI:470PF,1%,500V	80009	283-0620-00
A28C76	283-0177-00		CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A28C78	283-0177-00		CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A28C86	290-0527-00		CAP,FXD,ELCTLT:15UF,20%,20V	05397	T3688156M020AS
A28C98	283-0084-00		CAP,FXD,CER DI:270PF,5%,1000V	80009	283-0084-00
A28E83	276-0543-00		SHLD BEAD,ELEK:FERRITE	80009	276-0543-00
A28L38	108-0262-00		COIL,RF:FIXED,505NH	80009	108-0262-00
A28L44	114-0325-00		COIL,RF:VARIABLE,2.4-6.7UH	80009	114-0325-00
A28L54	114-0222-00		COIL,RF:VARIABLE,2-6UH	80009	114-0222-00
A28L64	120-1144-00		TRANSFORMER,RF:VARIABLE	80009	120-1144-00
A28L88	108-0733-00		COIL,RF:FIXED,117NH	80009	108-0733-00
A28L89	108-0733-00		COIL,RF:FIXED,117NH	80009	108-0733-00
A28LR14	108-0212-00		COIL,RF:FIXED,495NH	80009	108-0212-00
A28LR24	108-0212-00		COIL,RF:FIXED,495NH	80009	108-0212-00
A28Q11	151-0195-00		TRANSISTOR:SELECTED	80009	151-0195-00
A28Q20	151-0195-00		TRANSISTOR:SELECTED	80009	151-0195-00
A28Q21	151-0220-00		TRANSISTOR,SIG:BIPOLAR,PNP:40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A28Q31	151-0220-00		TRANSISTOR,SIG:BIPOLAR,PNP:40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A28Q71	151-0195-00		TRANSISTOR:SELECTED	80009	151-0195-00
A28Q81	151-0195-00		TRANSISTOR:SELECTED	80009	151-0195-00
A28Q83	151-0438-00		TRANSISTOR:PNP,SI,AMPLIFIER,625 MA	80009	151-0438-00
A28Q86	151-0103-00		TRANSISTOR,SIG:BIPOLAR,NPN:40V,800MA,300MHZ ,AMPLIFIER;2N2219A,TO-39	80009	151-0103-00
A28R1	322-3085-00		RES,FXD,FILM:75 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 75E0
A28R2	322-3085-00		RES,FXD,FILM:75 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 75E0
A28R11	311-1239-00		RES,VAR,NONWW:TRMR,2.5K OHM,0.5W	80009	311-1239-00
A28R12	315-0152-00		RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A28R14	321-0142-00		RES,FXD,FILM:294 OHM,1%,0.125W,TC=TO	80009	321-0142-00
A28R16	321-0091-00		RES,FXD,FILM:86.6 OHM,1%,0.125W,TC=TO	80009	321-0091-00
A28R19	321-0088-00		RES,FXD,FILM:80.6 OHM,1%,0.125W,TC=TO	80009	321-0088-00
A28R23	322-3211-00		RES,FXD,FILM:1.54K OHM,1%,0.2W,TC=TO	80009	322-3211-00
A28R24	322-3195-00		RES,FXD,FILM:1.05K OHM,1%,0.2W,TC=TO	80009	322-3195-00
A28R25	322-3195-00		RES,FXD,FILM:1.05K OHM,1%,0.2W,TC=TO	80009	322-3195-00
A28R31	315-0202-00		RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A28R37	315-0560-00		RES,FXD,FILM:56 OHM,5%,0.25W	80009	315-0560-00
A28R40	-----		(TEST SELECTED)		
A28R41	322-3193-07		RES,FXD,FILM:1K OHM,0.1%,0.2W,TC=T9	80009	322-3193-07
A28R42	322-3193-07		RES,FXD,FILM:1K OHM,0.1%,0.2W,TC=T9	80009	322-3193-07
A28R43	-----		(TEST SELECTED)		
A28R60	311-1241-00		RES,VAR,NONWW:TRMR,100K OHM,0.5W	80009	311-1241-00
A28R61	322-3306-00		RES,FXD,FILM:15K OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 15K0
A28R62	321-0312-00		RES,FXD,FILM:17.4K OHM,1%,0.125W,TC=TO	80009	321-0312-00
A28R64	322-3097-00		RES,FXD,FILM:100 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 100E
A28R72	322-3093-00		RES,FXD,FILM:90.9 OHM,1%,0.2W,TC=TO	91637	CCF50-2F90R90F
A28R77	301-0101-00		RES,FXD,FILM:100 OHM,5%,0.5W	01121	EB1015
A28R83	322-3222-00		RES,FXD,FILM:2K OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 2K00
A28R85	315-0470-00		RES,FXD,FILM:47 OHM,5%,0.25W	80009	315-0470-00
A28R86	315-0220-00		RES,FXD,FILM:22 OHM,5%,0.25W	80009	315-0220-00
A28R87	321-0066-00		RES,FXD,FILM:47.5 OHM,0.5%,0.125W,TC=TO	80009	321-0066-00
A28R88	322-3085-00		RES,FXD,FILM:75 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 75E0
A28R89	322-3085-00		RES,FXD,FILM:75 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 75E0
A28R90	322-3302-00		RES,FXD,FILM:13.7K OHM,1%,0.2W,TC=TO	80009	322-3302-00
A28R91	322-3273-00		RES,FXD,FILM:6.81K OHM,1%,0.2W,TC=TO	80009	322-3273-00
A28R92	315-0513-00		RES,FXD,FILM:51K OHM,5%,0.25W	80009	315-0513-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Discont	Name & Description	Mfr. Code	Mfr. Part No.
A28R93	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A28R95	315-0302-00		RES,FXD,FILM:3K OHM,5%,0.25W	80009	315-0302-00
A28R97	308-0299-00		RES,FXD,WW:300 OHM,1%,3W	01686	T2A-300R-F-10
A28T9	120-1149-00		TRANSFORMER,RF:TOROID	80009	120-1149-00
A28T27	120-1148-00		TRANSFORMER,RF:TOROID	80009	120-1148-00
A28U14	156-0130-01		MICROCKT,LINEAR:MODULATOR/DEMULATOR	80009	156-0130-01
A28VR94	152-0166-00		DIODE,ZENER:;6.2V,5%,0.4W;1N753A,DO-7 OR 3	80009	152-0166-00
A29	670-5009-02		CIRCUIT BD ASSY:IF DET/VIDEO AMPL	80009	670-5009-02
A29C5	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A29C7	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A29C17	283-0635-00		CAP,FXD,MICA DI:51PF,1%,500V	80009	283-0635-00
A29C34	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A29C41	283-0630-00		CAP,FXD,MICA DI:110PF,1%,100V	80009	283-0630-00
A29C47	283-0599-00		CAP,FXD,MICA DI:98PF,5%,500V	80009	283-0599-00
A29C51	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A29C57	283-0663-00		CAP,FXD,MICA DI:16.8PF,+/-0.5PF,500V	80009	283-0663-00
A29C58	290-0804-00		CAP,FXD,ELCTLT:10UF,+50-20%,25V	80009	290-0804-00
A29C59	290-0804-00		CAP,FXD,ELCTLT:10UF,+50-20%,25V	80009	290-0804-00
A29C66	283-0620-00		CAP,FXD,MICA DI:470PF,1%,500V	80009	283-0620-00
A29C76	283-0177-00		CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A29C78	283-0177-00		CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A29C86	290-0527-00		CAP,FXD,ELCTLT:15UF,20%,20V	05397	T368B156M020AS
A29C98	283-0084-00		CAP,FXD,CER DI:270PF,5%,1000V	80009	283-0084-00
A29E83	276-0543-00		SHLD BEAD,ELEK:FERRITE	80009	276-0543-00
A29L38	108-0262-00		COIL,RF:FIXED,505NH	80009	108-0262-00
A29L44	114-0325-00		COIL,RF:VARIABLE,2.4-6.7UH	80009	114-0325-00
A29L54	114-0222-00		COIL,RF:VARIABLE,2-6UH	80009	114-0222-00
A29L64	120-1144-00		TRANSFORMER,RF:VARIABLE	80009	120-1144-00
A29L88	108-0733-00		COIL,RF:FIXED,117NH	80009	108-0733-00
A29L89	108-0733-00		COIL,RF:FIXED,117NH	80009	108-0733-00
A29LR14	108-0212-00		COIL,RF:FIXED,495NH	80009	108-0212-00
A29LR24	108-0212-00		COIL,RF:FIXED,495NH	80009	108-0212-00
A29Q11	151-0195-00		TRANSISTOR:SELECTED	80009	151-0195-00
A29Q20	151-0195-00		TRANSISTOR:SELECTED	80009	151-0195-00
A29Q21	151-0220-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A29Q31	151-0220-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A29Q71	151-0195-00		TRANSISTOR:SELECTED	80009	151-0195-00
A29Q81	151-0195-00		TRANSISTOR:SELECTED	80009	151-0195-00
A29Q83	151-0438-00		TRANSISTOR:PNP,SI,AMPLIFIER,625 MA	80009	151-0438-00
A29Q86	151-0103-00		TRANSISTOR,SIG:BIPOLAR,NPN;40V,800MA,300MHZ ,AMPLIFIER;2N2219A,TO-39	80009	151-0103-00
A29R1	322-3085-00		RES,FXD,FILM:75 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 75E0
A29R2	322-3085-00		RES,FXD,FILM:75 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 75E0
A29R11	311-1239-00		RES,VAR,NONWM:TRMR,2.5K OHM,0.5W	80009	311-1239-00
A29R12	315-0152-00		RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A29R14	321-0142-00		RES,FXD,FILM:294 OHM,1%,0.125W,TC=TO	80009	321-0142-00
A29R16	321-0091-00		RES,FXD,FILM:86.6 OHM,1%,0.125W,TC=TO	80009	321-0091-00
A29R19	321-0088-00		RES,FXD,FILM:80.6 OHM,1%,0.125W,TC=TO	80009	321-0088-00
A29R23	322-3211-00		RES,FXD,FILM:1.54K OHM,1%,0.2W,TC=TO	80009	322-3211-00
A29R24	322-3195-00		RES,FXD,FILM:1.05K OHM,1%,0.2W,TC=TO	80009	322-3195-00
A29R25	322-3195-00		RES,FXD,FILM:1.05K OHM,1%,0.2W,TC=TO	80009	322-3195-00
A29R31	315-0202-00		RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A29R37	315-0560-00		RES,FXD,FILM:56 OHM,5%,0.25W	80009	315-0560-00
A29R40	-----		(TEST SELECTED)		
A29R41	322-3193-00		RES,FXD,FILM:1K OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 1K00
A29R42	322-3193-00		RES,FXD,FILM:1K OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 1K00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A29R43	-----		(TEST SELECTED)		
A29R60	311-1241-00		RES,VAR,NONWW:TRMR,100K OHM,0.5W	80009	311-1241-00
A29R61	322-3306-00		RES,FXD,FILM:15K OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 15K0
A29R62	321-0312-00		RES,FXD,FILM:17.4K OHM,1%,0.125W,TC=TO	80009	321-0312-00
A29R64	322-3097-00		RES,FXD,FILM:100 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 100E
A29R72	322-3093-00		RES,FXD,FILM:90.9 OHM,1%,0.2W,TC=TO	91637	CCF50-2F90R90F
A29R77	301-0101-00		RES,FXD,FILM:100 OHM,5%,0.5W	01121	EB1015
A29R83	322-3222-00		RES,FXD,FILM:2K OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 2K00
A29R85	315-0470-00		RES,FXD,FILM:47 OHM,5%,0.25W	80009	315-0470-00
A29R86	315-0220-00		RES,FXD,FILM:22 OHM,5%,0.25W	80009	315-0220-00
A29R87	321-0066-00		RES,FXD,FILM:47.5 OHM,0.5%,0.125W,TC=TO	80009	321-0066-00
A29R88	322-3085-00		RES,FXD,FILM:75 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 75E0
A29R89	322-3085-00		RES,FXD,FILM:75 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 75E0
A29R90	322-3302-00		RES,FXD,FILM:13.7K OHM,1%,0.2W,TC=TO	80009	322-3302-00
A29R91	322-3273-00		RES,FXD,FILM:6.81K OHM,1%,0.2W,TC=TO	80009	322-3273-00
A29R92	315-0513-00		RES,FXD,FILM:51K OHM,5%,0.25W	80009	315-0513-00
A29R93	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A29R95	315-0302-00		RES,FXD,FILM:3K OHM,5%,0.25W	80009	315-0302-00
A29R97	308-0299-00		RES,FXD,WW:300 OHM,1%,3W	01686	T2A-300R-F-10
A29T9	120-1149-00		TRANSFORMER,RF:TOROID	80009	120-1149-00
A29T27	120-1148-00		TRANSFORMER,RF:TOROID	80009	120-1148-00
A29U14	156-0130-01		MICROCKT, LINEAR:MODULATOR/DEMULATOR	80009	156-0130-01
A29VR94	152-0166-00		DIODE,ZENER:;6.2V,5%,0.4W;1N753A,DO-7 OR 3 5,TR	80009	152-0166-00
A30	-----		CKT BOARD ASSY:PIN DRIVER/IF ATTEN AMP (PART OF A80,OPTION 03) CKT BOARD ASSY:PIN DRIVER/IF ATTEN/MIXER (PART OF A82 OPTION 01,02 & 03)		
A30	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A30C87	290-0573-00		CAP,FXD,ELCTLT:2.7UF,20%,50V	05397	T368B275M050AS
A30C88	290-0512-00		CAP,FXD,ELCTLT:22UF,20%,15V	05397	T368B226M015AS
A30CR17	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A30CR21	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A30CR22	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A30CR27	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A30CR31	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A30CR32	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A30CR37	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A30CR38	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A30CR41	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A30CR47	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A30CR51	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A30CR52	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A30CR57	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02

Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A30CR58	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A30CR61	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A30CR62	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A30CR67	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A30CR68	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A30CR71	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A30CR77	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A30CR81	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A30Q10	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q19	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q20	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q21	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q28	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q29	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q30	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q31	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q38	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q39	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q40	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q48	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q50	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q51	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q58	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q59	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q60	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q61	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q68	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q69	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A30Q70	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A30Q79	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A30Q80	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A30Q81	151-0195-00		TRANSISTOR:SELECTED	80009	151-0195-00
A30Q88	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A30Q89	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A30R2	321-0932-07		RES,FXD,FILM:2.5K OHM,0.1%,0.125W,TC=T9	80009	321-0932-07
A30R12	321-0932-07		RES,FXD,FILM:2.5K OHM,0.1%,0.125W,TC=T9	80009	321-0932-07
A30R17	315-0275-00		RES,FXD,FILM:2.7M OHM,5%,0.25W	01121	CB2755
A30R21	321-0932-07		RES,FXD,FILM:2.5K OHM,0.1%,0.125W,TC=T9	80009	321-0932-07
A30R22	321-0816-07		RES,FXD,FILM:5K OHM,0.1%,0.125W,TC=T9	80009	321-0816-07
A30R27	315-0135-00		RES,FXD,FILM:1.3M OHM,5%,0.25W	80009	315-0135-00
A30R28	321-0463-00		RES,FXD,FILM:649K OHM,1%,0.125W	19701	5033YD649KOF
A30R31	322-3289-00		RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A30R32	322-3318-00		RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A30R37	321-0434-00		RES,FXD,FILM:324K OHM,1%,0.125W,TC=T0	07716	CEAD32402F
A30R38	322-3405-00		RES,FXD,FILM:162K OHM,1%,0.2W,TC=T0	91637	CCF50-2F16202F
A30R41	321-0924-07		RES,FXD,FILM:40K OHM,0.1%,0.125W,TC=T9	80009	321-0924-07
A30R47	321-0376-00		RES,FXD,FILM:80.6K OHM,1%,0.125W,TC=T0	80009	321-0376-00
A30R51	321-0376-00		RES,FXD,FILM:80.6K OHM,1%,0.125W,TC=T0	80009	321-0376-00
A30R52	322-3405-00		RES,FXD,FILM:162K OHM,1%,0.2W,TC=T0	91637	CCF50-2F16202F
A30R57	321-0924-07		RES,FXD,FILM:40K OHM,0.1%,0.125W,TC=T9	80009	321-0924-07
A30R58	322-3318-00		RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A30R61	321-0434-00		RES,FXD,FILM:324K OHM,1%,0.125W,TC=T0	07716	CEAD32402F
A30R62	321-0463-00		RES,FXD,FILM:649K OHM,1%,0.125W	19701	5033YD649KOF
A30R67	322-3289-00		RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A30R68	321-0816-07		RES,FXD,FILM:5K OHM,0.1%,0.125W,TC=T9	80009	321-0816-07
A30R71	315-0135-00		RES,FXD,FILM:1.3M OHM,5%,0.25W	80009	315-0135-00
A30R77	321-0932-07		RES,FXD,FILM:2.5K OHM,0.1%,0.125W,TC=T9	80009	321-0932-07
A30R81	315-0275-00		RES,FXD,FILM:2.7M OHM,5%,0.25W	01121	CB2755
A30R82	315-0161-00		RES,FXD,FILM:160 OHM,5%,0.25W	19701	5043CX160R0J
A30R87	321-0932-07		RES,FXD,FILM:2.5K OHM,0.1%,0.125W,TC=T9	80009	321-0932-07
A30R88	321-0932-07		RES,FXD,FILM:2.5K OHM,0.1%,0.125W,TC=T9	80009	321-0932-07
A30R92	322-3227-00		RES,FXD,FILM:2.26K OHM,1%,0.2W,TC=T0	91637	TO BE ASSIGNED
A30R93	322-3299-00		RES,FXD,FILM:12.7K OHM,1%,0.2W,TC=T0	80009	322-3299-00
A30U14	-----		(PART OF A80,OPTION 03) (PART OF A82,OPTION 01,02 & 03)		
A30U44	-----		(SEE FOOTNOTE ON A30U14)		
A30U64	-----		(SEE FOOTNOTE ON A30U14)		
A31	-----		CKT BOARD ASSY:PIN DRIVER/IF ATTN/MIXER (PART OF A82 OPTION 01,02 & 03) CKT BOARD ASSY:PIN DRIVER/IF ATTN AMP (PART OF A80)		
A31	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A31C87	290-0573-00		CAP,FXD,ELCTLT:2.7UF,20%,50V	05397	T368B275M050AS
A31C88	290-0512-00		CAP,FXD,ELCTLT:22UF,20%,15V	05397	T368B226M015AS
A31CR17	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A31CR21	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A31CR22	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A31CR27	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A31CR28	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02

Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Discont	Name & Description	Mfr. Code	Mfr. Part No.
A31CR31	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A31CR32	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A31CR37	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A31CR38	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A31CR41	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A31CR47	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A31CR51	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A31CR52	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A31CR57	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A31CR58	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A31CR61	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A31CR62	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A31CR67	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A31CR68	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A31CR71	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A31CR77	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A31CR81	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A31Q10	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A31Q19	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A31Q20	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A31Q21	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A31Q28	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A31Q29	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A31Q30	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A31Q31	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A31Q38	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A31Q39	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A31Q40	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A31Q48	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A31Q50	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A31Q51	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A31Q58	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A31Q59	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A31Q60	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A31Q61	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A31Q68	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A31Q69	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A31Q70	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A31Q79	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A31Q80	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A31Q81	151-0195-00		TRANSISTOR;SELECTED	80009	151-0195-00
A31Q88	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A31Q89	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A31R2	321-0932-07		RES,FXD,FILM:2.5K OHM,0.1%,0.125W,TC=T9	80009	321-0932-07
A31R12	321-0932-07		RES,FXD,FILM:2.5K OHM,0.1%,0.125W,TC=T9	80009	321-0932-07
A31R17	315-0275-00		RES,FXD,FILM:2.7M OHM,5%,0.25W	01121	CB2755
A31R21	321-0932-07		RES,FXD,FILM:2.5K OHM,0.1%,0.125W,TC=T9	80009	321-0932-07
A31R22	321-0816-07		RES,FXD,FILM:5K OHM,0.1%,0.125W,TC=T9	80009	321-0816-07
A31R27	315-0135-00		RES,FXD,FILM:1.3M OHM,5%,0.25W	80009	315-0135-00
A31R28	321-0463-00		RES,FXD,FILM:649K OHM,1%,0.125W	19701	5033YD649KOF
A31R31	322-3289-00		RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A31R32	322-3318-00		RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A31R37	321-0434-00		RES,FXD,FILM:324K OHM,1%,0.125W,TC=T0	07716	CEAD32402F
A31R38	322-3405-00		RES,FXD,FILM:162K OHM,1%,0.2W,TC=T0	91637	CCF50-2F16202F
A31R41	321-0924-07		RES,FXD,FILM:40K OHM,0.1%,0.125W,TC=T9	80009	321-0924-07
A31R47	321-0376-00		RES,FXD,FILM:80.6K OHM,1%,0.125W,TC=T0	80009	321-0376-00
A31R51	321-0376-00		RES,FXD,FILM:80.6K OHM,1%,0.125W,TC=T0	80009	321-0376-00
A31R52	322-3405-00		RES,FXD,FILM:162K OHM,1%,0.2W,TC=T0	91637	CCF50-2F16202F
A31R57	321-0924-07		RES,FXD,FILM:40K OHM,0.1%,0.125W,TC=T9	80009	321-0924-07
A31R58	322-3318-00		RES,FXD,FILM:20K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 20K0
A31R61	321-0434-00		RES,FXD,FILM:324K OHM,1%,0.125W,TC=T0	07716	CEAD32402F
A31R62	321-0463-00		RES,FXD,FILM:649K OHM,1%,0.125W	19701	5033YD649KOF
A31R67	322-3289-00		RES,FXD,FILM:10K OHM,1%,0.2W,TC=T0	80009	322-3289-00
A31R68	321-0816-07		RES,FXD,FILM:5K OHM,0.1%,0.125W,TC=T9	80009	321-0816-07
A31R71	315-0135-00		RES,FXD,FILM:1.3M OHM,5%,0.25W	80009	315-0135-00
A31R77	321-0932-07		RES,FXD,FILM:2.5K OHM,0.1%,0.125W,TC=T9	80009	321-0932-07
A31R81	315-0275-00		RES,FXD,FILM:2.7M OHM,5%,0.25W	01121	CB2755
A31R82	315-0161-00		RES,FXD,FILM:160 OHM,5%,0.25W	19701	5043CX160R0J
A31R87	321-0932-07		RES,FXD,FILM:2.5K OHM,0.1%,0.125W,TC=T9	80009	321-0932-07
A31R88	321-0932-07		RES,FXD,FILM:2.5K OHM,0.1%,0.125W,TC=T9	80009	321-0932-07
A31R92	322-3227-00		RES,FXD,FILM:2.26K OHM,1%,0.2W,TC=T0	91637	TO BE ASSIGNED
A31R93	322-3299-00		RES,FXD,FILM:12.7K OHM,1%,0.2W,TC=T0	80009	322-3299-00
A31U14	-----		(SEE FOOTNOTE ON A30U14)		
A31U44	-----		(SEE FOOTNOTE ON A30U14)		
A31U64	-----		(SEE FOOTNOTE ON A30U14)		



Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Dscont		Name & Description	Mfr. Code	Mfr. Part No.
A32	670-5010-01			CIRCUIT BD ASSY:IF INTERFACE	80009	670-5010-01
A32C23	283-0353-00			CAP,FXD,CER DI:0.1UF,10%,50V	04222	1210C104KAT050L
A32C24	283-0353-00			CAP,FXD,CER DI:0.1UF,10%,50V	04222	1210C104KAT050L
A32C29	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A32C59	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A32C69	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A32L41	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A32L41	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A32L42	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A32L42	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A32Q52	151-0207-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0207-00
A32R52	315-0153-00			RES,FXD,FILM:15K OHM,5%,0.25W	80009	315-0153-00
A32W20	175-2069-01			CABLE ASSY,RF:50 OHM COAX,2.25 L	80009	175-2069-01
A32W21	175-2066-01			CABLE ASSY,RF:50 OHM COAX,1.25 L	80009	175-2066-01
A32W22	175-2067-01			CABLE ASSY,RF:50 OHM COAX,1.375 L	80009	175-2067-01
A32W23	175-2073-01			CABLE ASSY,RF:50 OHM COAX,5.125 L	80009	175-2073-01
A32W24	175-2066-01			CABLE ASSY,RF:50 OHM COAX,1.25 L	80009	175-2066-01
A32W25	175-2074-01			CABLE ASSY,RF:50 OHM COAX,5.128L	80009	175-2074-01
A32W26	175-2066-01			CABLE ASSY,RF:50 OHM COAX,1.25 L	80009	175-2066-01
A32W27	175-2070-01			CABLE ASSY,RF:50 OHM COAX,2.75 L	80009	175-2070-01
A32W28	175-2067-01			CABLE ASSY,RF:50 OHM COAX,1.375 L	80009	175-2067-01
A32W29	175-2070-01			CABLE ASSY,RF:50 OHM COAX,2.75 L	80009	175-2070-01
A32W30	175-2072-01			CABLE ASSY,RF:50 OHM COAX,4.625 L	80009	175-2072-01
A32W31	175-2068-01			CABLE ASSY,RF:50 OHM COAX,2.0L	80009	175-2068-01
A32W32	175-2066-01			CABLE ASSY,RF:50 OHM COAX,1.25 L	80009	175-2066-01
A40	670-5011-01			CIRCUIT BD ASSY:1ST AUDIO MIXER	80009	670-5011-01
A40C15	283-0024-00			CAP,FXD,CER DI:0.1UF,+80-20%,50V	05397	C330C10Y25U1CA
A40C17	283-0024-00			CAP,FXD,CER DI:0.1UF,+80-20%,50V	05397	C330C10Y25U1CA
A40C31	283-0005-00			CAP,FXD,CER DI:0.01UF,+100-0%,250V	04222	SR30VE103ZAA
A40C37	283-0005-00			CAP,FXD,CER DI:0.01UF,+100-0%,250V	04222	SR30VE103ZAA
A40C44	283-0024-00			CAP,FXD,CER DI:0.1UF,+80-20%,50V	05397	C330C10Y25U1CA
A40C47	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A40C51	283-0618-00			CAP,FXD,MICA DI:130PF,2%,400V	80009	283-0618-00
A40C52	283-0669-00			CAP,FXD,MICA DI:360PF,1%,500V	80009	283-0669-00
A40C55	283-0005-00			CAP,FXD,CER DI:0.01UF,+100-0%,250V	04222	SR30VE103ZAA
A40C56	283-0669-00			CAP,FXD,MICA DI:360PF,1%,500V	80009	283-0669-00
A40C57	283-0005-00			CAP,FXD,CER DI:0.01UF,+100-0%,250V	04222	SR30VE103ZAA
A40C59	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A40C71	283-0615-00			CAP,FXD,MICA DI:33PF,5%,500V	80009	283-0615-00
A40C72	283-0005-00			CAP,FXD,CER DI:0.01UF,+100-0%,250V	04222	SR30VE103ZAA
A40C73	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	05397	C330C474M5U1CA
A40C75	283-0615-00			CAP,FXD,MICA DI:33PF,5%,500V	80009	283-0615-00
A40C78	283-0005-00			CAP,FXD,CER DI:0.01UF,+100-0%,250V	04222	SR30VE103ZAA
A40C82	283-0663-00			CAP,FXD,MICA DI:16.8PF,+/-0.5PF,500V	80009	283-0663-00
A40C95	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR30SE105ZAA
A40CR25	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A40CR26	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A40CR36	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A40CR45	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A40CR49	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A40CR85	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A40CR96	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A40L38	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A40L38	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A40L39	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A40L39	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A40L55	108-0606-00			COIL,RF:FIXED,31NH	80009	108-0606-00
A40L62	114-0246-00			COIL,RF:VARIABLE,700-1100NH	80009	114-0246-00
A40L66	114-0246-00			COIL,RF:VARIABLE,700-1100NH	80009	114-0246-00
A40L92	114-0220-00			COIL,RF:VARIABLE,1-3UH	80009	114-0220-00
A40LR5	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00
A40LR15	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00
A40LR19	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00
A40Q46	151-0188-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ ,AMPLIFIER;2N3906,TO-92 EBC	80009	151-0188-00
A40Q72	151-0472-00			TRANSISTOR,SIG:BIPOLAR,NPN;14V,80MA,1.0GHZ, AMPLIFIER;NE41632B,TO-92 EBC	80009	151-0472-00
A40Q84	151-0223-00			TRANSISTOR,SIG:BIPOLAR,NPN;15V,500MA,SWITCH ING;MPS2369A,TO-92 EBC	80009	151-0223-00
A40R1	322-3218-00			RES,FXD,FILM:1.82K OHM,1%,0.2W,TC=TO	80009	322-3218-00
A40R2	322-3143-00			RES,FXD,FILM:301 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 301E
A40R16	322-3218-00			RES,FXD,FILM:1.82K OHM,1%,0.2W,TC=TO	80009	322-3218-00
A40R21	321-0088-00			RES,FXD,FILM:80.6 OHM,1%,0.125W,TC=TO	80009	321-0088-00
A40R22	321-0088-00			RES,FXD,FILM:80.6 OHM,1%,0.125W,TC=TO	80009	321-0088-00
A40R34	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A40R35	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A40R42	315-0270-00			RES,FXD,FILM:27 OHM,5%,0.25W	80009	315-0270-00
A40R43	315-0432-00			RES,FXD,FILM:4.3K OHM,5%,0.25W	80009	315-0432-00
A40R44	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A40R47	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A40R48	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A40R54	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A40R55	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A40R57	315-0330-00			RES,FXD,FILM:33 OHM,5%,0.25W	80009	315-0330-00
A40R58	315-0392-00			RES,FXD,FILM:3.9K OHM,5%,0.25W	80009	315-0392-00
A40R73	315-0511-00			RES,FXD,FILM:510 OHM,5%,0.25W	80009	315-0511-00
A40R75	315-0510-00			RES,FXD,FILM:51 OHM,5%,0.25W	80009	315-0510-00
A40R76	315-0200-00			RES,FXD,FILM:20 OHM,5%,0.25W	80009	315-0200-00
A40R77	315-0121-00			RES,FXD,FILM:120 OHM,5%,0.25W	80009	315-0121-00
A40R78	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A40R79	315-0240-00			RES,FXD,FILM:24 OHM,5%,0.25W	80009	315-0240-00
A40R82	315-0432-00			RES,FXD,FILM:4.3K OHM,5%,0.25W	80009	315-0432-00
A40R85	315-0474-00			RES,FXD,FILM:470K OHM,5%,0.25W	80009	315-0474-00
A40R86	315-0474-00			RES,FXD,FILM:470K OHM,5%,0.25W	80009	315-0474-00
A40R96	315-0512-00			RES,FXD,FILM:5.1K OHM,5%,0.25W	80009	315-0512-00
A40T19	120-1148-00			TRANSFORMER,RF:TOROID	80009	120-1148-00
A40T31	120-1149-00			TRANSFORMER,RF:TOROID	80009	120-1149-00
A40U12	156-0130-02	B020000	B020699	IC,MISC:	80009	156-0130-02
A40U12	156-0130-00	B020700		IC,MISC:BIPOLAR,MODULATOR/DEMODULATOR;BALAN CED;MC1496G/LM1496H,TO-100	80009	156-0130-00
A40U88	156-0067-12	B020000	B020426	MICROCKT,LINEAR:OPERATIONAL AMPLIFIER	80009	156-0067-12
A40U88	156-0067-00	B020427		IC,LINEAR:BIPOLAR,OP-AMP;:741C,DIP08.3	80009	156-0067-00
A40VR98	152-0395-00			DIODE,ZENER:;:4.3V,5%,0.4W;1N749A,DO-35 OR 7,TR	80009	152-0395-00
A41	670-5012-04			CIRCUIT BD ASSY:SECOND AUDIO MIXER	80009	670-5012-04
A41C13	283-0752-00			CAP,FXD,MICA DI:345PF,1%,500V	80009	283-0752-00
A41C17	283-0024-00			CAP,FXD,CER DI:0.1UF,+80-20%,50V	05397	C330C10YZ5U1CA

Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Dscont		Name & Description	Mfr. Code	Mfr. Part No.
A41C21	283-0024-00			CAP,FXD,CER DI:0.1UF,+80-20%,50V	05397	C330C10YZ5U1CA
A41C25	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A41C26	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A41C31	283-0769-00			CAP,FXD,MICA DI:278 PF,1%,500V	80009	283-0769-00
A41C43	283-0024-00			CAP,FXD,CER DI:0.1UF,+80-20%,50V	05397	C330C10YZ5U1CA
A41C44	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A41C56	283-0142-00			CAP,FXD,CER DI:0.0027UF,5%,200V	80009	283-0142-00
A41C66	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A41C74	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A41C75	283-0024-00			CAP,FXD,CER DI:0.1UF,+80-20%,50V	05397	C330C10YZ5U1CA
A41C80	283-0670-00			CAP,FXD,MICA DI:375PF,1%,500V	80009	283-0670-00
A41C81	283-0596-00			CAP,FXD,MICA DI:528PF,1%,300V	80009	283-0596-00
A41C91	283-0642-00			CAP,FXD,MICA DI:33PF,+/-0.5PF,500V	00853	D105E330G0
A41C92	283-0024-00			CAP,FXD,CER DI:0.1UF,+80-20%,50V	05397	C330C10YZ5U1CA
A41CR75	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A41L24	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A41L24	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A41L26	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A41L26	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A41Q36	151-0302-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,800MA,300MHZ ,AMPLIFIER;2N2222A,TO-18	80009	151-0302-00
A41Q44	151-0302-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,800MA,300MHZ ,AMPLIFIER;2N2222A,TO-18	80009	151-0302-00
A41Q70	151-0192-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A41R12	322-3202-00			RES,FXD,FILM:1.24K OHM,1%,0.2W,TC=TO	80009	322-3202-00
A41R13	315-0152-00			RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A41R14	322-3196-00			RES,FXD,FILM:1.07K OHM,1%,0.2W,TC=TO	91637	CCF50-2F10700F
A41R22	322-3201-00			RES,FXD,FILM:1.21K OHM,1%,0.2W,TC=TO	80009	322-3201-00
A41R24	315-0621-00			RES,FXD,FILM:620 OHM,5%,0.25W	80009	315-0621-00
A41R34	315-0621-00			RES,FXD,FILM:620 OHM,5%,0.25W	80009	315-0621-00
A41R35	315-0162-00			RES,FXD,FILM:1.6K OHM,5%,0.25W	80009	315-0162-00
A41R41	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A41R42	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A41R44	315-0182-00			RES,FXD,FILM:1.8K OHM,5%,0.25W	80009	315-0182-00
A41R45	315-0123-00			RES,FXD,FILM:12K OHM,5%,0.25W	80009	315-0123-00
A41R46	315-0470-00			RES,FXD,FILM:47 OHM,5%,0.25W	80009	315-0470-00
A41R51	315-0301-00			RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A41R54	315-0301-00			RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A41R56	315-0681-00			RES,FXD,FILM:680 OHM,5%,0.25W	80009	315-0681-00
A41R58	315-0330-00			RES,FXD,FILM:33 OHM,5%,0.25W	80009	315-0330-00
A41R61	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A41R62	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A41R64	315-0301-00			RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A41R65	322-3222-00			RES,FXD,FILM:2K OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 2K00
A41R71	315-0471-00			RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A41R73	315-0511-00			RES,FXD,FILM:510 OHM,5%,0.25W	80009	315-0511-00
A41R76	315-0511-00			RES,FXD,FILM:510 OHM,5%,0.25W	80009	315-0511-00
A41R81	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A41R82	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A41R86	315-0100-00			RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A41R91	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A41T17	120-1142-00			TRANSFORMER,RF:INTERCARRIER,POT CORE	80009	120-1142-00
A41T31	120-1142-00			TRANSFORMER,RF:INTERCARRIER,POT CORE	80009	120-1142-00
A41U11	156-0033-00			MICROCKT,LINER:RF-IF AMPLIFIER	02735	CA3028A
A41U51	156-0130-02	B020000	B020699	IC,MISC:	80009	156-0130-02

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A41U51	156-0130-00	B020700		IC,MISC:BIPOLAR,MODULATOR/DEMULATOR;BALAN CED;MC1496G/LM1496H,TO-100	80009	156-0130-00
A41Y86	158-0128-00			XTAL UNIT,QTZ:5.510204MHZ,0.01%,PARALLEL,CL =32PF,PKG HC-6/U	33096	CCAT101112
A42	670-5013-02			CIRCUIT BD ASSY:AUDIO LIMITER	80009	670-5013-02
A42C3	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A42C5	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A42C13	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A42C15	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A42C44	283-0665-00			CAP,FXD,MICA DI:190PF,1%,100V	80009	283-0665-00
A42C45	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A42C46	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A42C47	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A42C54	283-0659-00			CAP,FXD,MICA DI:1160PF,2%,500V	80009	283-0659-00
A42C63	283-0706-00			CAP,FXD,MICA DI:91PF,1%,500V	80009	283-0706-00
A42C83	283-0620-00			CAP,FXD,MICA DI:470PF,1%,500V	80009	283-0620-00
A42L45	114-0311-00			COIL,RF:VARIABLE,65-190UH	80009	114-0311-00
A42L48	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A42L48	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A42L55	114-0303-00			COIL,RF:VARIABLE,6.5-23UH	80009	114-0303-00
A42L75	114-0340-00			COIL,RF:VARIABLE,350-750UH	80009	114-0340-00
A42L95	114-0310-00			COIL,RF:VARIABLE,22-80UH	80009	114-0310-00
A42R12	322-3135-00			RES,FXD,FILM:249 OHM,1%,0.2W,TC=TO	80009	322-3135-00
A42R44	322-3135-00			RES,FXD,FILM:249 OHM,1%,0.2W,TC=TO	80009	322-3135-00
A42R45	315-0821-00			RES,FXD,FILM:820 OHM,5%,0.25W	80009	315-0821-00
A42R47	315-0470-00			RES,FXD,FILM:47 OHM,5%,0.25W	80009	315-0470-00
A42R86	322-3164-00			RES,FXD,FILM:499 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 499E
A42T18	120-1151-00			TRANSFORMER,RF:TOROID	80009	120-1151-00
A42U15	156-0902-00			MICROCKT,DGTL:FM IF AMPL	04713	MC1355P
A43	670-7249-01			CIRCUIT BD ASSY:AUDIO DISCRIMINATOR	80009	670-7249-01
A43C00	290-0745-00			CAP,FXD,ELCTLT:22UF,+50-20%,25WVDC	24165	513D226M063BB4
A43C5	283-0596-00			CAP,FXD,MICA DI:528PF,1%,300V	80009	283-0596-00
A43C8	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A43C12	290-0755-00			CAP,FXD,ELCTLT:100UF,+50%-20%,10WVDC	54473	ECE-A10V100L
A43C20	290-0745-00			CAP,FXD,ELCTLT:22UF,+50-20%,25WVDC	24165	513D226M063BB4
A43C25	290-0944-00			CAP,FXD,ELCTLT:220UF,+50-20%,10V	55680	UVX1C221MPA
A43C26	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A43C28	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A43C35	283-0786-00			CAP,FXD,MICA DI:745PF,1%,500V	80009	283-0786-00
A43C42	283-0624-00			CAP,FXD,MICA DI:1300PF,2%,500V	80009	283-0624-00
A43C48	290-0782-00			CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A43C54	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A43C55	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	05397	C330C474M5U1CA
A43C56	283-0786-00			CAP,FXD,MICA DI:745PF,1%,500V	80009	283-0786-00
A43C65	283-0695-00			CAP,FXD,MICA DI:4440PF,1%,500V	80009	283-0695-00
A43C81	283-0024-00			CAP,FXD,CER DI:0.1UF,+80-20%,50V	05397	C330C10YZ5U1CA
A43C83	283-0632-00			CAP,FXD,MICA DI:87PF,1%,500V	80009	283-0632-00
A43C84	283-0024-00			CAP,FXD,CER DI:0.1UF,+80-20%,50V	05397	C330C10YZ5U1CA
A43C85	283-0623-00			CAP,FXD,MICA DI:1200PF,1%,100V	80009	283-0623-00
A43CR2	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A43CR16	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A43L33	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A43L41	114-0409-00			COIL,RF:VARIABLE,1.38-1.45MH	80009	114-0409-00
A43L43	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A43L43	120-0382-01	B020618	COIL, RF: 210UH, +28/-43%, 14 TURNS	TK1345	120-0382-01
A43L61	114-0409-00		COIL, RF: VARIABLE, 1.38-1.45MH	80009	114-0409-00
A43P65	131-0608-00		TERMINAL, PIN: 0.365 L X 0.025 BRZ GLD PL	80009	131-0608-00
A43Q8	151-0127-00		TRANSISTOR, SIG: BIPOLAR, NPN; 15V, 200MA, SWITCH	80009	151-0127-00
			ING; 2N2369, TO-18		
A43Q13	151-0127-00		TRANSISTOR, SIG: BIPOLAR, NPN; 15V, 200MA, SWITCH	80009	151-0127-00
			ING; 2N2369, TO-18		
A43Q14	151-0188-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 200MA, 250MHZ	80009	151-0188-00
			, AMPLIFIER; 2N3906, TO-92 EBC		
A43Q18	151-0301-00		TRANSISTOR, SIG: BIPOLAR, PNP; 60V, 600MA, 200MHZ	80009	151-0301-00
			, AMPLIFIER; 2N2907A, TO-18		
A43Q19	151-0301-00		TRANSISTOR, SIG: BIPOLAR, PNP; 60V, 600MA, 200MHZ	80009	151-0301-00
			, AMPLIFIER; 2N2907A, TO-18		
A43R1	315-0100-00		RES, FXD, FILM: 10 OHM, 5%, 0.25W	19701	5043CX10R00J
A43R2	322-3182-00		RES, FXD, FILM: 768 OHM, 1%, 0.2W, TC=TO	91637	CCF50-2F768R0F
A43R3	301-0471-00		RES, FXD, FILM: 470 OHM, 5%, 0.5W	19701	5053CX 470R0J
A43R5	301-0102-00		RES, FXD, CMPSN: 1K OHM, 5%, 0.50W	01121	EB1025
A43R8	315-0751-00		RES, FXD, FILM: 750 OHM, 5%, 0.25W	80009	315-0751-00
A43R10	315-0751-00		RES, FXD, FILM: 750 OHM, 5%, 0.25W	80009	315-0751-00
A43R11	322-3226-00		RES, FXD, FILM: 2.21K OHM, 1%, 0.2W, TC=TO	57668	CRB20 FXE 2K21
A43R16	315-0102-00		RES, FXD, FILM: 1K OHM, 5%, 0.25W	80009	315-0102-00
A43R17	315-0432-00		RES, FXD, FILM: 4.3K OHM, 5%, 0.25W	80009	315-0432-00
A43R18	315-0101-00		RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A43R21	315-0101-00		RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A43R22	321-0298-00		RES, FXD, FILM: 12.4K OHM, 1%, 0.125W, TC=TO	07716	CEAD12401F
A43R26	315-0102-00		RES, FXD, FILM: 1K OHM, 5%, 0.25W	80009	315-0102-00
A43R30	311-1241-00		RES, VAR, NONWW: TRMR, 100K OHM, 0.5W	80009	311-1241-00
A43R33	322-3256-00		RES, FXD, FILM: 4.53K OHM, 1%, 0.2W, TC=TO	91637	CCF50-2
A43R34	315-0104-00		RES, FXD, FILM: 100K OHM, 5%, 0.25W	80009	315-0104-00
A43R43	322-3197-00		RES, FXD, FILM: 1.1K OHM, 1%, 0.2W, TC=TO	80009	322-3197-00
A43R44	322-3246-00		RES, FXD, FILM: 3.57K OHM, 1%, 0.2W, TC=TO	80009	322-3246-00
A43R45	321-0345-00		RES, FXD, FILM: 38.3K OHM, 1%, 0.125W, TC=TO	80009	321-0345-00
A43R46	315-0473-00		RES, FXD, FILM: 47K OHM, 5%, 0.25W	80009	315-0473-00
A43R47	315-0473-00		RES, FXD, FILM: 47K OHM, 5%, 0.25W	80009	315-0473-00
A43R55	315-0205-00		RES, FXD, FILM: 2M OHM, 5%, 0.25W	80009	315-0205-00
A43R63	322-3197-00		RES, FXD, FILM: 1.1K OHM, 1%, 0.2W, TC=TO	80009	322-3197-00
A43R65	321-0316-00		RES, FXD, FILM: 19.1K OHM, 1%, 0.125W, TC=TO	07716	CEAD19101F
A43R67	322-3179-00		RES, FXD, FILM: 715 OHM, 1%, 0.2W, TC=TO	80009	322-3179-00
A43R71	311-1248-00		RES, VAR, NONWW: TRMR, 500 OHM, 0.5W	32997	3386X-1-501
A43R72	322-3267-00		RES, FXD, FILM: 5.9K OHM, 1%, 0.2W, TC=TO	80009	322-3267-00
A43R81	311-1237-00		RES, VAR, NONWW: 1K OHM, 10%, 0.50W	32997	3386X-DY6-102
A43R82	322-3267-00		RES, FXD, FILM: 5.9K OHM, 1%, 0.2W, TC=TO	80009	322-3267-00
A43R83	322-3267-00		RES, FXD, FILM: 5.9K OHM, 1%, 0.2W, TC=TO	80009	322-3267-00
A43R84	315-0102-00		RES, FXD, FILM: 1K OHM, 5%, 0.25W	80009	315-0102-00
A43R85	322-3251-00		RES, FXD, FILM: 4.02K OHM, 1%, 0.2W, TC=TO	57668	CRB20 FXE 4K02
A43R87	322-3281-00		RES, FXD, FILM: 8.25K OHM, 1%, 0.2W, TC=TO	80009	322-3281-00
A43R88	322-3179-00		RES, FXD, FILM: 715 OHM, 1%, 0.2W, TC=TO	80009	322-3179-00
A43R89	322-3251-00		RES, FXD, FILM: 4.02K OHM, 1%, 0.2W, TC=TO	57668	CRB20 FXE 4K02
A43TP19	214-0579-00		TERM, TEST POINT: BRS CD PL	TK0858	ORDER BY DESCR
A43U58	156-0067-12		MICROCKT, LINEAR: OPERATIONAL AMPLIFIER	80009	156-0067-12
A43U84	156-1272-00		IC, LINEAR: BIPOLAR, OP-AMP; DUAL, HIGH OUTPUT D	80009	156-1272-00
			RIVE, LOW NOISE; NE5532N, DIP08.3		
A43U85	156-1272-00		IC, LINEAR: BIPOLAR, OP-AMP; DUAL, HIGH OUTPUT D	80009	156-1272-00
			RIVE, LOW NOISE; NE5532N, DIP08.3		
A43VR12	152-0195-00		DIODE, ZENER: , 5.1V, 5%, 0.4W; 1N751A FMLY, DO-3	80009	152-0195-00
			5 OR 7		
A43VR47	152-0168-00		DIODE, ZENER: , 12V, 5%, 0.4W; 1N963B, DO-35 OR 7	80009	152-0168-00
			, TR		

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A43W64	131-0566-00		BUS, CONDUCTOR: DUMMY RES, 0.094 OD X 0.225 L	24546	OMA 07
A44	670-8896-01	B020000	CIRCUIT BD ASSY: AUDIO INTFC	80009	670-8896-01
A44	670-8896-02	B020118	CIRCUIT BD ASSY: AUDIO, INTERFACE	80009	670-8896-02
A44C9	290-0745-00		CAP, FXD, ELCTLT: 22UF, +50-20%, 25WVDC	24165	513D226M063BB4
A44C17	283-0421-00		CAP, FXD, CER DI: 0.1UF, +80-20%, 50V	04222	MD015C104MAA
A44C27	290-0525-00		CAP, FXD, ELCTLT: 4.7UF, 20%, 50V	05397	T368B475M050AS
A44C32	283-0593-00		CAP, FXD, MICA DI: 0.01UF, 1%, 100V	80009	283-0593-00
A44C33	283-0421-00		CAP, FXD, CER DI: 0.1UF, +80-20%, 50V	04222	MD015C104MAA
A44C34	290-0745-00		CAP, FXD, ELCTLT: 22UF, +50-20%, 25WVDC	24165	513D226M063BB4
A44C35	283-0060-00		CAP, FXD, CER DI: 100PF, 5%, 200V	80009	283-0060-00
A44C36	283-0111-00		CAP, FXD, CER DI: 0.1UF, 20%, 50V	80009	283-0111-00
A44C37	283-0555-00		CAP, FXD, MICA DI: 2000PF, 1%, 500V	80009	283-0555-00
A44C38	283-0555-00		CAP, FXD, MICA DI: 2000PF, 1%, 500V	80009	283-0555-00
A44C46	283-0111-00		CAP, FXD, CER DI: 0.1UF, 20%, 50V	80009	283-0111-00
A44C51	283-0593-00		CAP, FXD, MICA DI: 0.01UF, 1%, 100V	80009	283-0593-00
A44C54	290-0944-00		CAP, FXD, ELCTLT: 220UF, +50-20%, 10V	55680	UVX1C221MPA
A44C55	283-0111-00		CAP, FXD, CER DI: 0.1UF, 20%, 50V	80009	283-0111-00
A44C56	290-0522-00		CAP, FXD, ELCTLT: 1UF, 20%, 50V	05397	T368A105M050AZ
A44C58	290-0745-00		CAP, FXD, ELCTLT: 22UF, +50-20%, 25WVDC	24165	513D226M063BB4
A44C59	283-0695-00		CAP, FXD, MICA DI: 4440PF, 1%, 500V	80009	283-0695-00
A44C66	283-0693-00		CAP, FXD, MICA DI: 1730PF, 1%, 500V	80009	283-0693-00
A44C68	283-0103-00		CAP, FXD, CER DI: 180PF, 5%, 500V	80009	283-0103-00
A44C69	283-0593-00		CAP, FXD, MICA DI: 0.01UF, 1%, 100V	80009	283-0593-00
A44C72	283-0421-00		CAP, FXD, CER DI: 0.1UF, +80-20%, 50V	04222	MD015C104MAA
A44C73	283-0421-00		CAP, FXD, CER DI: 0.1UF, +80-20%, 50V	04222	MD015C104MAA
A44C86	283-0421-00		CAP, FXD, CER DI: 0.1UF, +80-20%, 50V	04222	MD015C104MAA
A44C92	283-0421-00		CAP, FXD, CER DI: 0.1UF, +80-20%, 50V	04222	MD015C104MAA
A44CR10	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02
A44CR11	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02
A44CR14	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02
A44CR15	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02
A44CR16	152-0460-00		DIODE, SIG: , REGLTR; 100V, 1.20MA IP, 1.45V VL; 1N5299, DO-35	04713	1N5299
A44CR20	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02
A44CR21	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02
A44CR22	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02
A44CR28	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02
A44CR30	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02
A44CR31	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02
A44CR40	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02
A44CR46	152-0040-00		DIODE, RECT: , ; 600V, 1A, 50A IFSM; 1N5061, DO-41, TR	80009	152-0040-00
A44CR50	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02
A44CR51	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02
A44CR52	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4152, DO-35, T&R	80009	152-0141-02

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No.		Name & Description	Mfr. Code	Mfr. Part No.
A44CR56	152-0040-00			DIODE,RECT.: ,600V,1A,50A IFSM;1N5061,DO-41, TR	80009	152-0040-00
A44CR72	152-0141-02			DIODE,SIG: ,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A44CR84	152-0141-02			DIODE,SIG: ,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A44CR85	152-0141-02			DIODE,SIG: ,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A44CR86	152-0141-02			DIODE,SIG: ,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A44CR88	152-0141-02			DIODE,SIG: ,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A44CR90	152-0141-02			DIODE,SIG: ,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A44CR91	152-0141-02			DIODE,SIG: ,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A44CR92	152-0141-02			DIODE,SIG: ,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A44F17	159-0021-00			FUSE,CARTRIDGE:3AG,2A,250V,FAST BLOW	75915	312 002
A44L66	108-0317-00			COIL,RF:FIXED,15 UH	TK1345	108-0317-00
A44L74	120-0382-00	B020000	B020617	COIL,RF:210UH,+28/-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA.	TK1345	120-0382-00
A44L74	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A44Q24	151-0232-00			TRANSISTOR,SIG:BIPOLAR,NPN;45V,30MA,60MHZ,A MPLIFIER,TWO DIE DUAL;2N2918,TO-78	80009	151-0232-00
A44Q27	151-0219-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A44Q28	151-0301-00			TRANSISTOR,SIG:BIPOLAR,PNP;60V,600MA,200MHZ ,AMPLIFIER;2N2907A,TO-18	80009	151-0301-00
A44Q29	151-0192-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A44Q46	151-0192-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A44R8	315-0750-00			RES,FXD,FILM:75 OHM,5%,0.25W	80009	315-0750-00
A44R9	315-0750-00			RES,FXD,FILM:75 OHM,5%,0.25W	80009	315-0750-00
A44R10	315-0270-00			RES,FXD,FILM:27 OHM,5%,0.25W	80009	315-0270-00
A44R11	315-0270-00			RES,FXD,FILM:27 OHM,5%,0.25W	80009	315-0270-00
A44R12	315-0242-00			RES,FXD,FILM:2.4K OHM,5%,0.25W	80009	315-0242-00
A44R16	315-0681-00			RES,FXD,FILM:680 OHM,5%,0.25W	80009	315-0681-00
A44R17	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A44R19	322-3001-00			RES,FXD,FILM:10 OHM,1%,0.2W,TC=TO	80009	322-3001-00
A44R20	322-3039-00			RES,FXD,FILM:24.9 OHM,1%,0.2W,TC=TO	80009	322-3039-00
A44R21	322-3039-00			RES,FXD,FILM:24.9 OHM,1%,0.2W,TC=TO	80009	322-3039-00
A44R22	315-0220-00			RES,FXD,FILM:22 OHM,5%,0.25W	80009	315-0220-00
A44R23	315-0220-00			RES,FXD,FILM:22 OHM,5%,0.25W	80009	315-0220-00
A44R24	321-1669-03			RES,FXD,FILM:5.31K OHM,0.25%,0.125W,	80009	321-1669-03
A44R25	315-0242-00			RES,FXD,FILM:2.4K OHM,5%,0.25W	80009	315-0242-00
A44R26	322-3194-00			RES,FXD,FILM:1.02K OHM,1%,0.2W,TC=TO	91637	CCF50-2610200F
A44R27	315-0123-00			RES,FXD,FILM:12K OHM,5%,0.25W	80009	315-0123-00
A44R28	315-0242-00			RES,FXD,FILM:2.4K OHM,5%,0.25W	80009	315-0242-00
A44R29	315-0152-00			RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A44R30	315-0220-00			RES,FXD,FILM:22 OHM,5%,0.25W	80009	315-0220-00
A44R31	315-0220-00			RES,FXD,FILM:22 OHM,5%,0.25W	80009	315-0220-00
A44R32	321-1669-03			RES,FXD,FILM:5.31K OHM,0.25%,0.125W,	80009	321-1669-03
A44R33	315-0222-00	670-8896-01	670-8896-01	RES,FXD,FILM:2.2K OHM,5%,0.25W	80009	315-0222-00
A44R33	315-0113-00	670-8896-02		RES,FXD,FILM:11K OHM,5%,0.25W	80009	315-0113-00
A44R34	315-0112-00			RES,FXD,FILM:1.1K OHM,5%,0.25W	80009	315-0112-00
A44R35	322-3169-00			RES,FXD,FILM:562 OHM,1%,0.2W,TC=TO	91637	CCF50-2F562R0F
A44R36	321-0300-00			RES,FXD,FILM:13.0K OHM,1%,0.125W,TC=TO	07716	CEAD13001F
A44R37	322-3105-00			RES,FXD,FILM:121 OHM,1%,0.2W,TC=TO	80009	322-3105-00
A44R38	315-0681-00			RES,FXD,FILM:680 OHM,5%,0.25W	80009	315-0681-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A44R39	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A44R40	322-3222-00			RES,FXD,FILM:2K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 2K00
A44R41	321-0303-00			RES,FXD,FILM:14.0K OHM,1%,0.125W,TC=T0	07716	CEAD 14001F
A44R42	315-0222-00	670-8896-01	670-8896-01	RES,FXD,FILM:2.2K OHM,5%,0.25W	80009	315-0222-00
A44R42	315-0113-00	670-8896-02		RES,FXD,FILM:11K OHM,5%,0.25W	80009	315-0113-00
A44R43	308-0685-00			RES,FXD,WW:1.5 OHM,5%,1W	75042	BW-20-1R500J
A44R44	315-0220-00			RES,FXD,FILM:22 OHM,5%,0.25W	80009	315-0220-00
A44R45	322-3251-00			RES,FXD,FILM:4.02K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 4K02
A44R46	308-0685-00			RES,FXD,WW:1.5 OHM,5%,1W	75042	BW-20-1R500J
A44R47	322-3210-00			RES,FXD,FILM:1.5K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K50
A44R48	321-0140-00			RES,FXD,FILM:280 OHM,1%,0.125W,TC=T0	07716	CEAD280R0F
A44R49	322-3138-00			RES,FXD,FILM:267 OHM,1%,0.2W,TC=T0	80009	322-3138-00
A44R50	315-0242-00			RES,FXD,FILM:2.4K OHM,5%,0.25W	80009	315-0242-00
A44R51	315-0270-00			RES,FXD,FILM:27 OHM,5%,0.25W	80009	315-0270-00
A44R52	315-0270-00			RES,FXD,FILM:27 OHM,5%,0.25W	80009	315-0270-00
A44R53	315-0242-00			RES,FXD,FILM:2.4K OHM,5%,0.25W	80009	315-0242-00
A44R54	311-2100-00	670-8896-01	670-8896-01	RES,VAR,NONWW:TRMR,1K OHM,10%,0.5W	32997	3386M-1-102
A44R54	311-1137-00	670-8896-02		RES,VAR,NONWW:TRMR,5K OHM,0.5W	01121	E2C502
A44R55	308-0685-00			RES,FXD,WW:1.5 OHM,5%,1W	75042	BW-20-1R500J
A44R56	315-0102-00	670-8896-01	670-8896-01	RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A44R56	315-0512-00	670-8896-02		RES,FXD,FILM:5.1K OHM,5%,0.25W	80009	315-0512-00
A44R57	308-0685-00			RES,FXD,WW:1.5 OHM,5%,1W	75042	BW-20-1R500J
A44R58	311-1223-00			RES,VAR,NONWW:TRMR,250 OHM,0.5W	32997	3386F-1-251
A44R59	311-0633-00			RES,VAR,NONWW:TRMR,5K OHM,0.5W	32997	3329H-L58-502
A44R66	322-3172-00			RES,FXD,FILM:604 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 604E
A44R67	321-0382-00			RES,FXD,FILM:93.1K OHM,1%,0.125W,TC=T0	07716	CEAD93101F
A44R68	322-3277-00			RES,FXD,FILM:7.5K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 7K50
A44R69	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A44R84	315-0682-00			RES,FXD,FILM:6.8K OHM,5%,0.25W	80009	315-0682-00
A44R85	315-0122-00			RES,FXD,FILM:1.2K OHM,5%,0.25W	80009	315-0122-00
A44R86	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A44R87	315-0470-00			RES,FXD,FILM:47 OHM,5%,0.25W	80009	315-0470-00
A44R90	315-0470-00			RES,FXD,FILM:47 OHM,5%,0.25W	80009	315-0470-00
A44R92	315-0122-00			RES,FXD,FILM:1.2K OHM,5%,0.25W	80009	315-0122-00
A44R93	315-0682-00			RES,FXD,FILM:6.8K OHM,5%,0.25W	80009	315-0682-00
A44R94	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A44R99	322-3085-00			RES,FXD,FILM:75 OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 75E0
A44S1	263-0010-00			SWITCH PB ASSY:1 PUSH,7.5 MM,W/2 CONTACTS	80009	263-0010-00
A44S4	263-0023-04			SWITCH,PB ASSY:7.5M,3 BUTTON,6 CONTACTS	80009	263-0023-04
A44S7	263-0015-03			SWITCH PB ASSY:2 LCH,7.5MM,4 CONTACTS	80009	263-0015-03
A44U44	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	SA201C103KAA
A44U45	281-0773-00			CAP,FXD,CER DI:0.01UF,10%,100V	04222	SA201C103KAA
A44VR12	152-0688-00			DIODE,ZENER:;2.4V,5%,0.4W;1N4370A,DO-7 OR 35	04713	1N4370A
A44VR13	152-0688-00			DIODE,ZENER:;2.4V,5%,0.4W;1N4370A,DO-7 OR 35	04713	1N4370A
A44VR40	152-0688-00			DIODE,ZENER:;2.4V,5%,0.4W;1N4370A,DO-7 OR 35	04713	1N4370A
A44VR41	152-0688-00			DIODE,ZENER:;2.4V,5%,0.4W;1N4370A,DO-7 OR 35	04713	1N4370A
A45	670-9069-00			CIRCUIT BD ASSY:Q-P FILTER/AMP	80009	670-9069-00
A45C4	281-0663-00			CAP,FXD,CER DI:10.4PF,1%,500V	80009	281-0663-00
A45C14	281-0656-00			CAP,FXD,CER DI:22PF,5%,500V	80009	281-0656-00
A45C23	281-0557-00			CAP,FXD,CER DI:1.8PF,+/-0.1PF,500V	80009	281-0557-00
A45C33	281-0515-00			CAP,FXD,CER DI:27PF,+/-1.35PF,500V	59660	302-004COGO-270J
A45C34	281-0610-00			CAP,FXD,CER DI:2.2PF,+/-0.1PF,500V	80009	281-0610-00
A45C40	281-0619-00			CAP,FXD,CER DI:1.2PF,+/-0.1PF,500V	52763	2RDPLZ007 1P20BC
A45C54	281-0515-00			CAP,FXD,CER DI:27PF,+/-1.35PF,500V	59660	302-004COGO-270J
A45C56	281-0610-00			CAP,FXD,CER DI:2.2PF,+/-0.1PF,500V	80009	281-0610-00



## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A45C59	283-0167-00			CAP,FXD,CER DI:0.1UF,10%,100V	80009	283-0167-00
A45C63	281-0557-00			CAP,FXD,CER DI:1.8PF,+/-0.1PF,500V	80009	281-0557-00
A45C74	281-0716-00			CAP,FXD,CER DI:13.8PF,1%,500V	TK1134	374-014C0G01389F
A45C77	283-0220-00			CAP,FXD,CER DI:0.01UF,20%,50V	04222	SR205C103MAA
A45C81	-----			(PART OF BOARD)		
A45C84	281-0578-00			CAP,FXD,CER DI:18PF,5%,500V	80009	281-0578-00
A45C85	281-0619-00			CAP,FXD,CER DI:1.2PF,+/-0.1PF,500V	52763	2RDPLZ007 1P20BC
A45C86	283-0220-00			CAP,FXD,CER DI:0.01UF,20%,50V	04222	SR205C103MAA
A45C89	283-0220-00			CAP,FXD,CER DI:0.01UF,20%,50V	04222	SR205C103MAA
A45C93	283-0220-00			CAP,FXD,CER DI:0.01UF,20%,50V	04222	SR205C103MAA
A45C94	283-0167-00			CAP,FXD,CER DI:0.1UF,10%,100V	80009	283-0167-00
A45C95	283-0190-00			CAP,FXD,CER DI:0.47UF,5%,50V	04222	SR305C474JAA
A45C96	283-0220-00			CAP,FXD,CER DI:0.01UF,20%,50V	04222	SR205C103MAA
A45C97	283-0194-00			CAP,FXD,CER DI:4.7UF,20%,50V	05397	C350C475MSUICA
A45CR19	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A45J4	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	80009	131-0608-00
A45J6	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	80009	131-0608-00
A45J9	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	80009	131-0608-00
A45J24	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	80009	131-0608-00
A45J45	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	80009	131-0608-00
A45J92	131-0608-00			TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	80009	131-0608-00
A45L1	114-0419-00			COIL,RF:VARIABLE 1.1-1.2UH POT CORE	80009	114-0419-00
A45L30	114-0419-00			COIL,RF:VARIABLE 1.1-1.2UH POT CORE	80009	114-0419-00
A45L50	114-0419-00			COIL,RF:VARIABLE 1.1-1.2UH POT CORE	80009	114-0419-00
A45L69	120-0382-00	B020000	B020617	COIL,RF:210UH,+28/-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A45L69	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A45L70	114-0419-00			COIL,RF:VARIABLE 1.1-1.2UH POT CORE	80009	114-0419-00
A45P29	131-1771-00			CONN,BOX:	TK1483	TKO-06254-103
A45Q86	151-0427-00			TRANSISTOR,SIG:BIPOLAR,NPN;15V,50MA,900 MHZ ,AMPLIFIER;2N5770,TO-92 EBC	80009	151-0427-00
A45Q87	151-0472-00			TRANSISTOR,SIG:BIPOLAR,NPN;14V,80MA,1.0GHZ, AMPLIFIER;NE41632B,TO-92 EBC	80009	151-0472-00
A45Q91	151-0333-00			TRANSISTOR,SIG:BIPOLAR,NPN;15V,50MA,650MHZ, AMPLIFIER;MPS918/MPS3563,TO-92 EBC	80009	151-0333-00
A45R77	315-0510-04			RES,FXD,CMPSN:51 OHM,5%,0.25 W	80009	315-0510-04
A45R80	315-0101-03			RES,FXD,CMPSN:100 OHM,5%,0.25W	80009	315-0101-03
A45R81	315-0133-00			RES,FXD,FILM:13K OHM,5%,0.25W	80009	315-0133-00
A45R82	315-0102-03			RES,FXD,CMPSN:1K OHM,5%,0.25W	80009	315-0102-03
A45R83	315-0470-03			RES,FXD,CMPSN:47 OHM,5%,0.25W	80009	315-0470-03
A45R86	315-0100-02			RES,FXD,CMPSN:10 OHM,5%,0.25W	80009	315-0100-02
A45R87	315-0511-02			RES,FXD,CMPSN:510 OHM,.25W,5%,A-B ONLY	80009	315-0511-02
A45R88	315-0101-03			RES,FXD,CMPSN:100 OHM,5%,0.25W	80009	315-0101-03
A45R89	315-0101-03			RES,FXD,CMPSN:100 OHM,5%,0.25W	80009	315-0101-03
A45R90	315-0470-03			RES,FXD,CMPSN:47 OHM,5%,0.25W	80009	315-0470-03
A45R94	315-0510-04			RES,FXD,CMPSN:51 OHM,5%,0.25 W	80009	315-0510-04
A45R95	315-0301-02			RES,FXD,CMPSN:300 OHM,5%,0.25W	80009	315-0301-02
A45R96	315-0101-03			RES,FXD,CMPSN:100 OHM,5%,0.25W	80009	315-0101-03
A45R97	315-0121-02			RES,FXD,CMPSN:120 OHM,5%,0.25W	01121	CB1215 CARD PK
A45R98	315-0103-03			RES,FXD,CMPSN:10K OHM,5%,0.25W	80009	315-0103-03
A45R99	315-0430-02			RES,FXD,CMPSN:43 OHM,5%,0.25W	80009	315-0430-02
A45T85	120-1155-00			TRANSFORMER,RF:TOROID	80009	120-1155-00
A45W16	131-0566-00			BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	24546	OMA 07
A45W76	131-0566-00			BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	24546	OMA 07
A46	670-5007-00			CIRCUIT BD ASSY:IF LIMITER	80009	670-5007-00
A46C5	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A46C9	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A46C14	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A46C18	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A46C24	283-0688-00			CAP,FXD,MICA DI:464PF,1%,300V	80009	283-0688-00
A46C34	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A46C44	283-0688-00			CAP,FXD,MICA DI:464PF,1%,300V	80009	283-0688-00
A46C54	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A46C64	283-0688-00			CAP,FXD,MICA DI:464PF,1%,300V	80009	283-0688-00
A46C69	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A46C74	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A46C84	283-0688-00			CAP,FXD,MICA DI:464PF,1%,300V	80009	283-0688-00
A46C87	290-0745-00			CAP,FXD,ELCTLT:22UF,+50-20%,25WVDC	24165	513D226M063BB4
A46C89	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	05397	C330C474M5U1CA
A46C94	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A46C98	290-0745-00			CAP,FXD,ELCTLT:22UF,+50-20%,25WVDC	24165	513D226M063BB4
A46CR11	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A46CR31	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A46CR61	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A46CR81	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A46L5	108-0262-00			COIL,RF:FIXED,505NH	80009	108-0262-00
A46L15	108-0736-00			COIL,RF:FIXED,828NH	TK2042	ORDER BY DESC
A46L17	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A46L17	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A46L35	108-0262-00			COIL,RF:FIXED,505NH	80009	108-0262-00
A46L37	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A46L37	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A46L45	108-0736-00			COIL,RF:FIXED,828NH	TK2042	ORDER BY DESC
A46L54	108-0262-00	B020000	B020617	COIL,RF:FIXED,505NH	80009	108-0262-00
A46L54	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A46L57	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A46L57	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A46L58	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A46L58	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A46L64	108-0736-00			COIL,RF:FIXED,828NH	TK2042	ORDER BY DESC
A46L75	108-0262-00			COIL,RF:FIXED,505NH	80009	108-0262-00
A46L76	120-0382-00			COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A46L84	108-0736-00			COIL,RF:FIXED,828NH	TK2042	ORDER BY DESC
A46Q2	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A46Q9	151-0472-02			TRANSISTOR:NPN,SI,TO-92	80009	151-0472-02
A46Q15	151-0472-02			TRANSISTOR:NPN,SI,TO-92	80009	151-0472-02
A46Q21	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A46Q22	151-0472-02			TRANSISTOR:NPN,SI,TO-92	80009	151-0472-02
A46Q32	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A46Q35	151-0472-02			TRANSISTOR:NPN,SI,TO-92	80009	151-0472-02
A46Q41	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A46Q43	151-0472-02			TRANSISTOR:NPN,SI,TO-92	80009	151-0472-02
A46Q52	151-0190-00			TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A46Q55	151-0472-02		TRANSISTOR:NPN,SI,TO-92	80009	151-0472-02
A46Q60	151-0190-00		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A46Q62	151-0472-02		TRANSISTOR:NPN,SI,TO-92	80009	151-0472-02
A46Q75	151-0472-02		TRANSISTOR:NPN,SI,TO-92	80009	151-0472-02
A46Q81	151-0190-00		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A46Q90	151-0190-00		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A46Q92	151-0472-02		TRANSISTOR:NPN,SI,TO-92	80009	151-0472-02
A46R1	315-0362-00		RES,FXD,FILM:3.6K OHM,5%,0.25W	80009	315-0362-00
A46R2	322-3126-00		RES,FXD,FILM:200 OHM,1%,0.2W,TC=TO	80009	322-3126-00
A46R4	322-3147-00		RES,FXD,FILM:332 OHM,1%,0.2W,TC=TO	80009	322-3147-00
A46R5	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A46R8	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A46R11	322-3126-00		RES,FXD,FILM:200 OHM,1%,0.2W,TC=TO	80009	322-3126-00
A46R12	315-0471-00		RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A46R15	322-3051-00		RES,FXD,FILM:33.2 OHM,1%,0.2W,TC=TO	57668	CRB20FXE301K
A46R18	315-0102-00		RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A46R19	321-0068-00		RES,FXD,FILM:49.9 OHM,0.1%,0.125W,TC=TO	80009	321-0068-00
A46R21	315-0362-00		RES,FXD,FILM:3.6K OHM,5%,0.25W	80009	315-0362-00
A46R22	322-3126-00		RES,FXD,FILM:200 OHM,1%,0.2W,TC=TO	80009	322-3126-00
A46R24	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A46R25	315-0471-00		RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A46R26	322-3147-00		RES,FXD,FILM:332 OHM,1%,0.2W,TC=TO	80009	322-3147-00
A46R30	311-1280-00		RES,VAR,NONWM:TRMR,1K OHM,0.5W	80009	311-1280-00
A46R31	315-0471-00		RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A46R34	322-3051-00		RES,FXD,FILM:33.2 OHM,1%,0.2W,TC=TO	57668	CRB20FXE301K
A46R35	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A46R41	322-3126-00		RES,FXD,FILM:200 OHM,1%,0.2W,TC=TO	80009	322-3126-00
A46R45	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A46R46	315-0471-00		RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A46R47	322-3147-00		RES,FXD,FILM:332 OHM,1%,0.2W,TC=TO	80009	322-3147-00
A46R50	311-1280-00		RES,VAR,NONWM:TRMR,1K OHM,0.5W	80009	311-1280-00
A46R51	315-0362-00		RES,FXD,FILM:3.6K OHM,5%,0.25W	80009	315-0362-00
A46R52	322-3126-00		RES,FXD,FILM:200 OHM,1%,0.2W,TC=TO	80009	322-3126-00
A46R57	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A46R61	315-0471-00		RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A46R62	322-3126-00		RES,FXD,FILM:200 OHM,1%,0.2W,TC=TO	80009	322-3126-00
A46R64	322-3051-00		RES,FXD,FILM:33.2 OHM,1%,0.2W,TC=TO	57668	CRB20FXE301K
A46R65	315-0471-00		RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A46R70	322-3239-00		RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 3K01
A46R71	322-3126-00		RES,FXD,FILM:200 OHM,1%,0.2W,TC=TO	80009	322-3126-00
A46R73	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A46R74	322-3147-00		RES,FXD,FILM:332 OHM,1%,0.2W,TC=TO	80009	322-3147-00
A46R75	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A46R80	322-3164-00		RES,FXD,FILM:499 OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 499E
A46R81	315-0471-00		RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A46R82	322-3126-00		RES,FXD,FILM:200 OHM,1%,0.2W,TC=TO	80009	322-3126-00
A46R84	322-3051-00		RES,FXD,FILM:33.2 OHM,1%,0.2W,TC=TO	57668	CRB20FXE301K
A46R94	315-0510-00		RES,FXD,FILM:51 OHM,5%,0.25W	80009	315-0510-00
A46R95	315-0471-00		RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A50	670-5016-01		CIRCUIT BD ASSY:REF CONTROL	80009	670-5016-01
A50C3	283-0633-00		CAP,FXD,MICA DI:77PF,1%,100V	80009	283-0633-00
A50C6	283-0649-00		CAP,FXD,MICA DI:105PF,1%,500V	80009	283-0649-00
A50C14	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A50C16	283-0649-00		CAP,FXD,MICA DI:105PF,1%,500V	80009	283-0649-00
A50C30	283-0706-00		CAP,FXD,MICA DI:91PF,1%,500V	80009	283-0706-00
A50C31	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A50C35	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A50C37	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A50C52	283-0644-00		CAP,FXD,MICA DI:150PF,1%,500V	80009	283-0644-00
A50C54	290-0536-00		CAP,FXD,ELCTLT:10UF,20%,25V TANTALUM	05397	T368B106M025AS
A50C59	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A50C63	283-0706-00		CAP,FXD,MICA DI:91PF,1%,500V	80009	283-0706-00
A50C67	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A50C71	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A50C78	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A50C83	290-0574-00		CAP,FXD,ELCTLT:47UF,10%,20V	05397	T368C476K0202AS
A50C85	283-0644-00		CAP,FXD,MICA DI:150PF,1%,500V	80009	283-0644-00
A50C87	283-0114-00		CAP,FXD,CER DI:1500PF,5%,200V	80009	283-0114-00
A50C94	290-0535-00		CAP,FXD,ELCTLT:33UF,20%,10V TANTALUM	24165	196D336X0010KA1
A50C95	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A50CR85	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A50CR91	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A50L15	120-0382-00	B020000 B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A50L15	120-0382-01	B020618	COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A50L52	108-0443-00		COIL,RF:FIXED,23.5UH	80009	108-0443-00
A50L62	108-0443-00		COIL,RF:FIXED,23.5UH	80009	108-0443-00
A50LR12	108-0543-00		COIL,RF:FIXED,1.1UH	TK1345	108-0543-00
A50LR13	108-0735-00		COIL,RF:FIXED,584NH	80009	108-0735-00
A50Q2	151-0333-00		TRANSISTOR,SIG:BIPOLAR,NPN;15V,50MA,650MHZ,AMPLIFIER:MPS918/MPS3563,TO-92 EBC	80009	151-0333-00
A50Q35	151-0333-00		TRANSISTOR,SIG:BIPOLAR,NPN;15V,50MA,650MHZ,AMPLIFIER:MPS918/MPS3563,TO-92 EBC	80009	151-0333-00
A50Q70	151-0192-00		TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A50Q80	151-0127-00		TRANSISTOR,SIG:BIPOLAR,NPN;15V,200MA,SWITCH ING;2N2369,TO-18	80009	151-0127-00
A50Q87	151-0220-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER:2N3906(SEL),TO-92 EBC	80009	151-0220-00
A50Q88	151-0192-00		TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A50Q92	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER:MPS4250,TO-92 EBC	80009	151-0219-00
A50R4	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A50R5	315-0102-00		RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A50R6	315-0472-00		RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A50R10	315-0102-00		RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A50R11	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A50R16	315-0472-00		RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A50R21	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A50R25	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A50R31	315-0511-00		RES,FXD,FILM:510 OHM,5%,0.25W	80009	315-0511-00
A50R33	315-0472-00		RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A50R34	315-0302-00		RES,FXD,FILM:3K OHM,5%,0.25W	80009	315-0302-00
A50R35	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A50R36	315-0510-00		RES,FXD,FILM:51 OHM,5%,0.25W	80009	315-0510-00
A50R40	311-1245-00		RES,VAR,NONWM:TRMR,10K OHM,0.5W	32997	3386X-DY6-103
A50R43	315-0222-00		RES,FXD,FILM:2.2K OHM,5%,0.25W	80009	315-0222-00
A50R45	315-0302-00		RES,FXD,FILM:3K OHM,5%,0.25W	80009	315-0302-00
A50R48	322-3193-00		RES,FXD,FILM:1K OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 1K00
A50R49	315-0202-00		RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A50R50	311-1245-00		RES,VAR,NONWM:TRMR,10K OHM,0.5W	32997	3386X-DY6-103
A50R53	322-3301-00		RES,FXD,FILM:13.3K OHM,1%,0.2W,TC=TO	80009	322-3301-00
A50R56	322-3352-00		RES,FXD,FILM:45.3K OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 45K3
A50R57	315-0104-00		RES,FXD,FILM:100K OHM,5%,0.25W	80009	315-0104-00

Component No.	Tektronix Part No.	Serial/Assembly No.		Name & Description	Mfr. Code	Mfr. Part No.
		Effective	Discont			
A50R60	311-1246-00			RES,VAR,NONWM:TRMR,50K OHM,0.5W	32997	3386X-1-503
A50R63	322-3225-00			RES,FXD,FILM:2.15K OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 2K15
A50R64	321-0359-00			RES,FXD,FILM:53.6K OHM,1%,0.125W,TC=TO	07716	CEAD53601F
A50R66	315-0623-00			RES,FXD,FILM:62K OHM,5%,0.25W	80009	315-0623-00
A50R70	311-1246-00			RES,VAR,NONWM:TRMR,50K OHM,0.5W	32997	3386X-1-503
A50R72	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A50R73	315-0511-00			RES,FXD,FILM:510 OHM,5%,0.25W	80009	315-0511-00
A50R74	315-0513-00			RES,FXD,FILM:51K OHM,5%,0.25W	80009	315-0513-00
A50R75	321-0419-00			RES,FXD,FILM:226K OHM,1%,0.125W,TC=TO	07716	CEAD22602F
A50R76	322-3302-00			RES,FXD,FILM:13.7K OHM,1%,0.2W,TC=TO	80009	322-3302-00
A50R78	315-0153-00			RES,FXD,FILM:15K OHM,5%,0.25W	80009	315-0153-00
A50R81	315-0183-00			RES,FXD,FILM:18K OHM,5%,0.25W	80009	315-0183-00
A50R83	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A50R84	315-0272-00			RES,FXD,FILM:2.7K OHM,5%,0.25W	80009	315-0272-00
A50R89	322-3268-00			RES,FXD,FILM:6.04K OHM,1%,0.2W,TC=TO	80009	322-3268-00
A50R90	315-0270-00			RES,FXD,FILM:27 OHM,5%,0.25W	80009	315-0270-00
A50R91	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A50R96	322-3287-00			RES,FXD,FILM:9.53K OHM,1%,0.2W,TC=TO	80009	322-3287-00
A50R97	322-3262-00			RES,FXD,FILM:5.23K OHM,1%,0.2W,TC=TO	80009	322-3262-00
A50R98	315-0182-00			RES,FXD,FILM:1.8K OHM,5%,0.25W	80009	315-0182-00
A50R99	322-3073-00			RES,FXD,FILM:56.2 OHM,1%,0.2W,TC=TO	80009	322-3073-00
A50U23	156-0130-02	B020000	B020699	IC,MISC:	80009	156-0130-02
A50U23	156-0130-00	B020700		IC,MISC:BIPOLAR,MODULATOR/DEMULATOR;BALAN	80009	156-0130-00
				CED;MC1496G/LM1496H,TO-100		
A50U56	156-0158-04			MICROCKT,LINEAR:DUAL OPNL AMPL	TK0961	UPC251D
A50Y18	158-0149-00			XTAL UNIT,QTZ:24.25 MHZ,0.01%,SERIES	80009	158-0149-00
A51	670-5018-00			CIRCUIT BD ASSY:REF OSCILLATOR	80009	670-5018-00
A51C7	281-0552-00			CAP,FXD,CER DI:25PF,5%,500V	80009	281-0552-00
A51C8	283-0636-00			CAP,FXD,MICA DI:36PF,1.4%,500V	80009	283-0636-00
A51C13	283-0730-00			CAP,FXD,MICA DI:274PF,1%,500V	80009	283-0730-00
A51C16	283-0730-00			CAP,FXD,MICA DI:274PF,1%,500V	80009	283-0730-00
A51C20	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A51C24	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A51C28	283-0067-00			CAP,FXD,CER DI:0.001UF,10%,200V	51406	
A51C30	283-0671-00			CAP,FXD,MICA DI:164PF,1%,500V	80009	283-0671-00
A51C35	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A51C36	283-0114-00			CAP,FXD,CER DI:1500PF,5%,200V	80009	283-0114-00
A51C45	290-0745-00			CAP,FXD,ELCTLT:22UF,+50-20%,25WVDC	24165	513D226M0638B4
A51C51	283-0638-00			CAP,FXD,MICA DI:130PF,1%,500V	80009	283-0638-00
A51C56	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A51C60	283-0598-00			CAP,FXD,MICA DI:253PF,5%,500V	80009	283-0598-00
A51C62	283-0004-00			CAP,FXD,CER DI:0.02UF,+80-20%,150V	80009	283-0004-00
A51C63	283-0004-00			CAP,FXD,CER DI:0.02UF,+80-20%,150V	80009	283-0004-00
A51C64	283-0004-00			CAP,FXD,CER DI:0.02UF,+80-20%,150V	80009	283-0004-00
A51C66	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A51C84	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A51CR9	152-0665-00			SEMICON DVC,DI:VVC,S1,30V,A276	25088	BB1096
A51CR47	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4	80009	152-0141-02
				152,D0-35,T&R		
A51CR48	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4	80009	152-0141-02
				152,D0-35,T&R		
A51L3	114-0372-00			COIL,RF:VARIABLE,1.5-2.7UH	80009	114-0372-00
A51L18	108-0897-00			COIL,RF:FIXED,230UH,30%	80009	108-0897-00
A51L31	108-0215-00			COIL,RF:FIXED,1.1UH	TK1345	108-0215-00
A51L41	114-0246-00			COIL,RF:VARIABLE,700-1100NH	80009	114-0246-00
A51LR12	108-0328-00			COIL,RF:FIXED,275UH	TK1345	108-0328-00
A51LR56	108-0520-00			COIL,RF:FIXED,2.2UH	80009	108-0520-00
A51LR71	108-0212-00			COIL,RF:FIXED,495NH	80009	108-0212-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A51Q16	151-0198-00		TRANSISTOR,SIG:BIPOLAR,NPN;15V,50MA,600 MHZ ,AMPLIFIER;MPS918,TO-92 EBC	80009	151-0198-00
A51Q22	151-0333-00		TRANSISTOR,SIG:BIPOLAR,NPN;15V,50MA,650MHZ, AMPLIFIER;MPS918/MPS3563,TO-92 EBC	80009	151-0333-00
A51Q32	151-0333-00		TRANSISTOR,SIG:BIPOLAR,NPN;15V,50MA,650MHZ, AMPLIFIER;MPS918/MPS3563,TO-92 EBC	80009	151-0333-00
A51Q35	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A51Q72	151-0325-00		TRANSISTOR,SIG:BIPOLAR,PNP;15V,50MA,SWITCHI NG;2N5771,TO-92 EBC CASE	80009	151-0325-00
A51Q74	151-0472-00		TRANSISTOR,SIG:BIPOLAR,NPN;14V,80MA,1.0GHZ, AMPLIFIER;NE41632B,TO-92 EBC	80009	151-0472-00
A51R10	315-0272-00		RES,FXD,FILM:2.7K OHM,5%,0.25W	80009	315-0272-00
A51R11	315-0332-00		RES,FXD,FILM:3.3K OHM,5%,0.25W	80009	315-0332-00
A51R13	315-0682-00		RES,FXD,FILM:6.8K OHM,5%,0.25W	80009	315-0682-00
A51R15	315-0471-00		RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A51R21	315-0470-00		RES,FXD,FILM:47 OHM,5%,0.25W	80009	315-0470-00
A51R23	315-0332-00		RES,FXD,FILM:3.3K OHM,5%,0.25W	80009	315-0332-00
A51R26	315-0471-00		RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A51R27	315-0153-00		RES,FXD,FILM:15K OHM,5%,0.25W	80009	315-0153-00
A51R46	315-0472-00		RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A51R52	315-0391-00		RES,FXD,FILM:390 OHM,5%,0.25W	80009	315-0391-00
A51R53	315-0470-00		RES,FXD,FILM:47 OHM,5%,0.25W	80009	315-0470-00
A51R54	315-0470-00		RES,FXD,FILM:47 OHM,5%,0.25W	80009	315-0470-00
A51R57	315-0470-00		RES,FXD,FILM:47 OHM,5%,0.25W	80009	315-0470-00
A51R58	301-0122-00		RES,FXD,FILM:1.2K OHM,5%,0.5W	57668	TR50J-E 1K2
A51R62	315-0472-00		RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A51R65	315-0360-00		RES,FXD,FILM:36 OHM,5%,0.25W	80009	315-0360-00
A51R81	315-0202-00		RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A51R83	315-0151-00		RES,FXD,FILM:150 OHM,5%,0.25W	80009	315-0151-00
A51R84	315-0100-00		RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A51R85	301-0301-00		RES,FXD,FILM:300 OHM,5%,0.5W	80009	301-0301-00
A52	670-5017-00		CIRCUIT BD ASSY:PHASE SHIFTER	80009	670-5017-00
A52C1	281-0209-00		CAP,VAR,AIR DI:1.3-5.4PF,250V	80009	281-0209-00
A52C3	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A52C8	281-0511-00		CAP,FXD,CER DI:22PF,+/-2.2PF,500V	80009	281-0511-00
A52C10	283-0645-00		CAP,FXD,MICA DI:790PF,1%,300V	80009	283-0645-00
A52C11	283-0060-00		CAP,FXD,CER DI:100PF,5%,200V	80009	283-0060-00
A52C16	281-0504-00		CAP,FXD,CER DI:10PF,+/-1PF,500V	80009	281-0504-00
A52C21	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A52C22	283-0672-00		CAP,FXD,MICA DI:200PF,1%,500V	80009	283-0672-00
A52C45	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A52C46	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A52C47	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A52C48	283-0204-00		CAP,FXD,CER DI:0.01UF,20%,50V	51406	RPE110Z5U103M50V
A52C66	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A52C78	281-0504-00		CAP,FXD,CER DI:10PF,+/-1PF,500V	80009	281-0504-00
A52C83	283-0204-00		CAP,FXD,CER DI:0.01UF,20%,50V	51406	RPE110Z5U103M50V
A52C88	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A52C89	283-0204-00		CAP,FXD,CER DI:0.01UF,20%,50V	51406	RPE110Z5U103M50V
A52C90	283-0634-00		CAP,FXD,MICA DI:65PF,1%,100V	80009	283-0634-00
A52C94	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A52C95	283-0634-00		CAP,FXD,MICA DI:65PF,1%,100V	80009	283-0634-00
A52CR10	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A52CR32	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A52CR33	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02

Component No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A52CR41	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A52CR42	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A52CR43	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A52CR44	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A52CR45	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A52CR50	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A52CR51	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A52CR52	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A52CR54	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A52CR55	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A52CR63	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A52CR64	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A52CR65	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A52E37	276-0543-00		SHLD BEAD,ELEK:FERRITE	80009	276-0543-00
A52L20	108-0103-00		COIL,RF:FIXED,2.45UH	80009	108-0103-00
A52L98	114-0246-00		COIL,RF:VARIABLE,700-1100NH	80009	114-0246-00
A52LR47	108-0212-00		COIL,RF:FIXED,495NH	80009	108-0212-00
A52Q3	151-1005-02		TRANSISTOR,SIG:JFET,N-CH;5V,6MA,2MS,500 OHM ;2N4303,TO-92,CHK	80009	151-1005-02
A52Q15	151-0192-00		TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A52Q17	151-0220-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A52Q18	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A52Q37	151-0472-00		TRANSISTOR,SIG:BIPOLAR,NPN;14V,80MA,1.0GHZ, AMPLIFIER;NE41632B,TO-92 EBC	80009	151-0472-00
A52Q38	151-0325-00		TRANSISTOR,SIG:BIPOLAR,PNP;15V,50MA,SWITCHI NG;2N5771,TO-92 EBC CASE	80009	151-0325-00
A52Q59	151-0325-01		TRANSISTOR:SELECTED	TK0040	151-0325-01
A52R3	315-0396-00		RES,FXD,FILM:39M OHM,5%,0.25W	80009	315-0396-00
A52R5	315-0103-00		RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A52R6	315-0153-00		RES,FXD,FILM:15K OHM,5%,0.25W	80009	315-0153-00
A52R7	315-0473-00		RES,FXD,FILM:47K OHM,5%,0.25W	80009	315-0473-00
A52R9	315-0154-00		RES,FXD,FILM:150K OHM,5%,0.25W	80009	315-0154-00
A52R13	315-0472-00		RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A52R14	315-0103-00		RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A52R15	315-0183-00		RES,FXD,FILM:18K OHM,5%,0.25W	80009	315-0183-00
A52R18	315-0222-00		RES,FXD,FILM:2.2K OHM,5%,0.25W	80009	315-0222-00
A52R19	315-0303-00		RES,FXD,FILM:30K OHM,5%,0.25W	80009	315-0303-00
A52R25	315-0302-00		RES,FXD,FILM:3K OHM,5%,0.25W	80009	315-0302-00
A52R26	301-0301-00		RES,FXD,FILM:300 OHM,5%,0.5W	80009	301-0301-00
A52R34	315-0123-00		RES,FXD,FILM:12K OHM,5%,0.25W	80009	315-0123-00
A52R36	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A52R49	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A52R52	315-0102-00		RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A52R53	322-3220-00		RES,FXD,FILM:1.91K OHM,1%,0.2W,TC=TO	80009	322-3220-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A52R55	322-3243-00		RES,FXD,FILM:3.32K OHM,1%,0.2W,TC=TO	91637	CCF50-1-G33200F
A52R56	322-3262-00		RES,FXD,FILM:5.23K OHM,1%,0.2W,TC=TO	80009	322-3262-00
A52R57	315-0681-00		RES,FXD,FILM:680 OHM,5%,0.25W	80009	315-0681-00
A52R58	315-0152-00		RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A52R61	322-3266-00		RES,FXD,FILM:5.76K OHM,1%,0.2W,TC=TO	80009	322-3266-00
A52R62	321-0291-00		RES,FXD,FILM:10.5K OHM,1%,0.125W,TC=TO	80009	321-0291-00
A52R63	322-3193-00		RES,FXD,FILM:1K OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 1K00
A52R70	322-3211-00		RES,FXD,FILM:1.54K OHM,1%,0.2W,TC=TO	80009	322-3211-00
A52R71	322-3266-00		RES,FXD,FILM:5.76K OHM,1%,0.2W,TC=TO	80009	322-3266-00
A52R72	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A52R73	315-0102-00		RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A52R74	322-3210-00		RES,FXD,FILM:1.5K OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 1K50
A52R76	315-0102-00		RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A52R77	322-3269-00		RES,FXD,FILM:6.19K OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 6K19
A52R82	315-0100-00		RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A52R84	315-0100-00		RES,FXD,FILM:10 OHM,5%,0.25W	19701	5043CX10RR00J
A52R91	315-0102-00		RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A52R92	315-0910-00		RES,FXD,FILM:91 OHM,5%,0.25W	80009	315-0910-00
A52R93	315-0512-00		RES,FXD,FILM:5.1K OHM,5%,0.25W	80009	315-0512-00
A52R94	315-0103-00		RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A52R96	315-0910-00		RES,FXD,FILM:91 OHM,5%,0.25W	80009	315-0910-00
A52T58	120-1150-00		TRANSFORMER,RF:TOROID	80009	120-1150-00
A52U22	156-0770-00		IC,LINEAR:BIFET,OP-AMP;;LF356,T0-99	27014	LF356H
A52U81	156-0130-02	B020000	IC,MISC:	80009	156-0130-02
A52U81	156-0130-00	B020700	IC,MISC:BIPOLAR,MODULATOR/DEMULATOR;BALAN CED;MC1496G/LM1496H,T0-100	80009	156-0130-00
A52U84	156-0130-02	B020000	IC,MISC:	80009	156-0130-02
A52U84	156-0130-00	B020700	IC,MISC:BIPOLAR,MODULATOR/DEMULATOR;BALAN CED;MC1496G/LM1496H,T0-100	80009	156-0130-00
A53	322-3243-00		RES,FXD,FILM:3.32K OHM,1%,0.2W,TC=TO	91637	CCF50-1-G33200F
A53	670-5019-00		CIRCUIT BD ASSY:CONVERTER PHASE LOCK	80009	670-5019-00
A53C9	283-0114-00		CAP,FXD,CER DI:1500PF,5%,200V	80009	283-0114-00
A53C15	283-0210-00		CAP,FXD,CER DI:0.0056UF,20%,100V	04222	SR211C562MAA
A53C33	290-0525-00		CAP,FXD,ELCTLT:4.7UF,20%,50V	05397	T368B475M050AS
A53C34	283-0210-00		CAP,FXD,CER DI:0.0056UF,20%,100V	04222	SR211C562MAA
A53C44	283-0142-00		CAP,FXD,CER DI:0.0027UF,5%,200V	80009	283-0142-00
A53C45	283-0142-00		CAP,FXD,CER DI:0.0027UF,5%,200V	80009	283-0142-00
A53C46	283-0616-00		CAP,FXD,MICA DI:75PF,5%,500V	80009	283-0616-00
A53C51	283-0616-00		CAP,FXD,MICA DI:75PF,5%,500V	80009	283-0616-00
A53C57	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A53C64	283-0598-00		CAP,FXD,MICA DI:253PF,5%,500V	80009	283-0598-00
A53C66	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A53C70	283-0644-00		CAP,FXD,MICA DI:150PF,1%,500V	80009	283-0644-00
A53C71	283-0598-00		CAP,FXD,MICA DI:253PF,5%,500V	80009	283-0598-00
A53C72	283-0644-00		CAP,FXD,MICA DI:150PF,1%,500V	80009	283-0644-00
A53C75	283-0644-00		CAP,FXD,MICA DI:150PF,1%,500V	80009	283-0644-00
A53C76	283-0644-00		CAP,FXD,MICA DI:150PF,1%,500V	80009	283-0644-00
A53C79	283-0600-00		CAP,FXD,MICA DI:43PF,5%,500V	80009	283-0600-00
A53C84	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A53C88	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A53C92	283-0004-00		CAP,FXD,CER DI:0.02UF,+80-20%,150V	80009	283-0004-00
A53C94	283-0004-00		CAP,FXD,CER DI:0.02UF,+80-20%,150V	80009	283-0004-00
A53C99	283-0600-00		CAP,FXD,MICA DI:43PF,5%,500V	80009	283-0600-00
A53CR19	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A53CR23	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A53CR24	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02



Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Discont	Name & Description	Mfr. Code	Mfr. Part No.
A53CR26	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A53CR42	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A53CR47	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A53L54	108-0226-00		COIL,RF:FIXED,100UH	76493	B4257
A53L55	108-0226-00		COIL,RF:FIXED,100UH	76493	B4257
A53L61	108-0226-00		COIL,RF:FIXED,100UH	76493	B4257
A53L62	108-0226-00		COIL,RF:FIXED,100UH	76493	B4257
A53L63	108-0226-00		COIL,RF:FIXED,100UH	76493	B4257
A53L66	108-0226-00		COIL,RF:FIXED,100UH	76493	B4257
A53L70	108-0226-00		COIL,RF:FIXED,100UH	76493	B4257
A53L72	108-0226-00		COIL,RF:FIXED,100UH	76493	B4257
A53L89	108-0683-00		COIL,RF:FIXED,900NH	80009	108-0683-00
A53Q8	151-0216-00		TRANSISTOR,SIG:BIPOLAR,PNP;25V,100MA,170MHZ ,AMPLIFIER;MPS6523,TO-92 EBC	80009	151-0216-00
A53Q18	151-0192-00		TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A53Q32	151-0192-00		TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A53Q42	151-0220-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A53Q43	151-0188-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,250MHZ ,AMPLIFIER;2N3906,TO-92 EBC	80009	151-0188-00
A53Q45	151-0192-00		TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A53Q46	151-0192-00		TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A53Q50	151-0192-00		TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A53Q53	151-0192-00		TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A53Q94	151-0333-00		TRANSISTOR,SIG:BIPOLAR,NPN;15V,50MA,650MHZ, AMPLIFIER;MPS918/MPS3563,TO-92 EBC	80009	151-0333-00
A53Q95	151-0333-00		TRANSISTOR,SIG:BIPOLAR,NPN;15V,50MA,650MHZ, AMPLIFIER;MPS918/MPS3563,TO-92 EBC	80009	151-0333-00
A53R1	315-0204-00		RES,FXD,FILM:200K OHM,5%,0.25W	80009	315-0204-00
A53R4	315-0204-00		RES,FXD,FILM:200K OHM,5%,0.25W	80009	315-0204-00
A53R5	315-0122-00		RES,FXD,FILM:1.2K OHM,5%,0.25W	80009	315-0122-00
A53R6	315-0104-00		RES,FXD,FILM:100K OHM,5%,0.25W	80009	315-0104-00
A53R7	315-0123-00		RES,FXD,FILM:12K OHM,5%,0.25W	80009	315-0123-00
A53R9	315-0105-00		RES,FXD,FILM:1M OHM,5%,0.25W	80009	315-0105-00
A53R10	322-3169-00		RES,FXD,FILM:562 OHM,1%,0.2W,TC=TO	91637	CCF50-2F562R0F
A53R11	315-0680-00		RES,FXD,FILM:68 OHM,5%,0.25W	80009	315-0680-00
A53R13	315-0563-00		RES,FXD,FILM:56K OHM,5%,0.25W	80009	315-0563-00
A53R14	315-0563-00		RES,FXD,FILM:56K OHM,5%,0.25W	80009	315-0563-00
A53R15	315-0104-00		RES,FXD,FILM:100K OHM,5%,0.25W	80009	315-0104-00
A53R16	315-0333-00		RES,FXD,FILM:33K OHM,5%,0.25W	80009	315-0333-00
A53R17	315-0104-00		RES,FXD,FILM:100K OHM,5%,0.25W	80009	315-0104-00
A53R18	315-0335-00		RES,FXD,FILM:3.3M OHM,5%,0.25W	01121	CB3355
A53R19	315-0392-00		RES,FXD,FILM:3.9K OHM,5%,0.25W	80009	315-0392-00
A53R20	315-0221-00		RES,FXD,FILM:220 OHM,5%,0.25W	80009	315-0221-00
A53R22	315-0751-00		RES,FXD,FILM:750 OHM,5%,0.25W	80009	315-0751-00
A53R23	315-0680-00		RES,FXD,FILM:68 OHM,5%,0.25W	80009	315-0680-00
A53R25	315-0102-00		RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A53R26	315-0105-00		RES,FXD,FILM:1M OHM,5%,0.25W	80009	315-0105-00
A53R27	315-0273-00		RES,FXD,FILM:27K OHM,5%,0.25W	80009	315-0273-00
A53R31	315-0221-00		RES,FXD,FILM:220 OHM,5%,0.25W	80009	315-0221-00
A53R35	322-3239-00		RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 3K01
A53R36	315-0102-00		RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A53R37	322-3239-00		RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=TO	57668	CRB20 FXE 3K01
A53R40	322-3243-00		RES,FXD,FILM:3.32K OHM,1%,0.2W,TC=TO	91637	CCF50-1-G33200F
A53R41	322-3169-00		RES,FXD,FILM:562 OHM,1%,0.2W,TC=TO	91637	CCF50-2F562R0F
A53R42	315-0102-00		RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A53R46	315-0122-00			RES,FXD,FILM:1.2K OHM,5%,0.25W	80009	315-0122-00
A53R47	315-0473-00			RES,FXD,FILM:47K OHM,5%,0.25W	80009	315-0473-00
A53R48	315-0473-00			RES,FXD,FILM:47K OHM,5%,0.25W	80009	315-0473-00
A53R49	315-0562-00			RES,FXD,FILM:5.6K OHM,5%,0.25W	80009	315-0562-00
A53R51	315-0512-00			RES,FXD,FILM:5.1K OHM,5%,0.25W	80009	315-0512-00
A53R53	315-0122-00			RES,FXD,FILM:1.2K OHM,5%,0.25W	80009	315-0122-00
A53R55	315-0625-00			RES,FXD,FILM:6.2M OHM,5%,0.25W	01121	CB6255
A53R56	315-0205-00			RES,FXD,FILM:2M OHM,5%,0.25W	80009	315-0205-00
A53R73	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A53R74	315-0512-00			RES,FXD,FILM:5.1K OHM,5%,0.25W	80009	315-0512-00
A53R76	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A53R81	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A53R83	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A53R84	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A53R85	315-0152-00			RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A53R86	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A53R87	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A53R91	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A53R92	315-0302-00			RES,FXD,FILM:3K OHM,5%,0.25W	80009	315-0302-00
A53R96	315-0302-00			RES,FXD,FILM:3K OHM,5%,0.25W	80009	315-0302-00
A53R97	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A53R98	315-0151-00			RES,FXD,FILM:150 OHM,5%,0.25W	80009	315-0151-00
A53U3	156-0356-01			MICROCKT,LINEAR:OPNL AMPL,CHECKED	02735	CA3080TX
A53U13	156-0356-01			MICROCKT,LINEAR:OPNL AMPL,CHECKED	02735	CA3080TX
A53U59	156-0158-04			MICROCKT,LINEAR:DUAL OPNL AMPL	TK0961	UPC251D
A53U81	156-0130-02	B020000	B020699	IC,MISC:	80009	156-0130-02
A53U81	156-0130-00	B020700		IC,MISC:BIPOLAR,MODULATOR/DEMODULATOR;BALAN	80009	156-0130-00
				CEC;MC1496G/LM1496H,TO-100		
A53U87	156-0130-02	B020000	B020699	IC,MISC:	80009	156-0130-02
A53U87	156-0130-00	B020700		IC,MISC:BIPOLAR,MODULATOR/DEMODULATOR;BALAN	80009	156-0130-00
				CEC;MC1496G/LM1496H,TO-100		
A54	670-5020-00			CIRCUIT BD ASSY:DETECTOR LO SWITCH	80009	670-5020-00
A54C10	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A54C13	283-0004-00			CAP,FXD,CER DI:0.02UF,+80-20%,150V	80009	283-0004-00
A54C21	283-0004-00			CAP,FXD,CER DI:0.02UF,+80-20%,150V	80009	283-0004-00
A54C34	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A54C36	283-0004-00			CAP,FXD,CER DI:0.02UF,+80-20%,150V	80009	283-0004-00
A54C43	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A54C44	283-0065-00			CAP,FXD,CER DI:0.001UF,5%,50V	80009	283-0065-00
A54C51	283-0004-00			CAP,FXD,CER DI:0.02UF,+80-20%,150V	80009	283-0004-00
A54C56	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A54C58	281-0509-00			CAP,FXD,CER DI:15PF,+/-1.5PF,500V	80009	281-0509-00
A54C63	283-0615-00			CAP,FXD,MICA DI:33PF,5%,500V	80009	283-0615-00
A54C65	283-0004-00			CAP,FXD,CER DI:0.02UF,+80-20%,150V	80009	283-0004-00
A54C66	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A54C67	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A54C71	283-0004-00			CAP,FXD,CER DI:0.02UF,+80-20%,150V	80009	283-0004-00
A54C75	283-0004-00			CAP,FXD,CER DI:0.02UF,+80-20%,150V	80009	283-0004-00
A54C85	283-0004-00			CAP,FXD,CER DI:0.02UF,+80-20%,150V	80009	283-0004-00
A54CR14	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4	80009	152-0141-02
				152,DO-35,T&R		
A54CR15	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4	80009	152-0141-02
				152,DO-35,T&R		
A54CR22	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4	80009	152-0141-02
				152,DO-35,T&R		
A54CR41	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4	80009	152-0141-02
				152,DO-35,T&R		
A54CR59	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4	80009	152-0141-02
				152,DO-35,T&R		

Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Discnt.		Name & Description	Mfr. Code	Mfr. Part No.
A54CR61	152-0141-02			DIODE, SIG: ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A54CR63	152-0141-02			DIODE, SIG: ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A54CR78	152-0141-02			DIODE, SIG: ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A54L31	120-0382-00	B020000	B020617	COIL, RF: 210UH, +28%-43%, 14 TURNS, TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A54L31	120-0382-01	B020618		COIL, RF: 210UH, +28/-43%, 14 TURNS	TK1345	120-0382-01
A54LR63	108-0212-00			COIL, RF: FIXED, 495NH	80009	108-0212-00
A54LR66	108-0520-00			COIL, RF: FIXED, 2.2UH	80009	108-0520-00
A54Q3	151-0192-00			TRANSISTOR: NPN, SI, TO-92	80009	151-0192-00
A54Q4	151-0164-00			TRANSISTOR, SIG: BIPOLAR, PNP; 60V, 600MA, 200MHZ , AMPLIFIER; MPS2907A, TO-92 EBC	04713	MPS2907A
A54Q17	151-0192-00			TRANSISTOR: NPN, SI, TO-92	80009	151-0192-00
A54Q19	151-0220-00			TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 200MA, 400MHZ , AMPLIFIER; 2N3906(SEL), TO-92 EBC	80009	151-0220-00
A54Q34	151-0472-00			TRANSISTOR, SIG: BIPOLAR, NPN; 14V, 80MA, 1.0GHZ, AMPLIFIER; NE41632B, TO-92 EBC	80009	151-0472-00
A54Q35	151-0472-00			TRANSISTOR, SIG: BIPOLAR, NPN; 14V, 80MA, 1.0GHZ, AMPLIFIER; NE41632B, TO-92 EBC	80009	151-0472-00
A54Q62	151-0325-00			TRANSISTOR, SIG: BIPOLAR, PNP; 15V, 50MA, SWITCHI NG; 2N5771, TO-92 EBC CASE	80009	151-0325-00
A54Q72	151-0472-00			TRANSISTOR, SIG: BIPOLAR, NPN; 14V, 80MA, 1.0GHZ, AMPLIFIER; NE41632B, TO-92 EBC	80009	151-0472-00
A54R2	315-0101-00			RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A54R3	315-0472-00			RES, FXD, FILM: 4.7K OHM, 5%, 0.25W	80009	315-0472-00
A54R5	315-0101-00			RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A54R6	315-0753-00			RES, FXD, FILM: 75K OHM, 5%, 0.25W	80009	315-0753-00
A54R7	315-0472-00			RES, FXD, FILM: 4.7K OHM, 5%, 0.25W	80009	315-0472-00
A54R8	315-0103-00			RES, FXD, FILM: 10K OHM, 5%, 0.25W	80009	315-0103-00
A54R12	301-0511-00			RES, FXD, FILM: 510 OHM, 5%, 0.5W	19701	5053CX510R0J
A54R13	315-0152-00			RES, FXD, FILM: 1.5K OHM, 5%, 0.25W	80009	315-0152-00
A54R19	315-0133-00			RES, FXD, FILM: 13K OHM, 5%, 0.25W	80009	315-0133-00
A54R23	315-0432-00			RES, FXD, FILM: 4.3K OHM, 5%, 0.25W	80009	315-0432-00
A54R24	315-0101-00			RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A54R25	315-0101-00			RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A54R31	315-0332-00			RES, FXD, FILM: 3.3K OHM, 5%, 0.25W	80009	315-0332-00
A54R32	315-0101-00			RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A54R33	315-0471-00			RES, FXD, FILM: 470 OHM, 5%, 0.25W	80009	315-0471-00
A54R34	315-0100-00			RES, FXD, FILM: 10 OHM, 5%, 0.25W	19701	5043CX10R0R0J
A54R36	315-0101-00			RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A54R38	315-0510-00			RES, FXD, FILM: 51 OHM, 5%, 0.25W	80009	315-0510-00
A54R43	315-0471-00			RES, FXD, FILM: 470 OHM, 5%, 0.25W	80009	315-0471-00
A54R48	301-0122-00			RES, FXD, FILM: 1.2K OHM, 5%, 0.5W	57668	TR50J-E 1K2
A54R50	301-0511-00			RES, FXD, FILM: 510 OHM, 5%, 0.5W	19701	5053CX510R0J
A54R55	315-0472-00			RES, FXD, FILM: 4.7K OHM, 5%, 0.25W	80009	315-0472-00
A54R58	315-0470-00			RES, FXD, FILM: 47 OHM, 5%, 0.25W	80009	315-0470-00
A54R60	315-0101-00			RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A54R64	315-0680-00			RES, FXD, FILM: 68 OHM, 5%, 0.25W	80009	315-0680-00
A54R65	315-0202-00			RES, FXD, FILM: 2K OHM, 5%, 0.25W	80009	315-0202-00
A54R70	315-0470-00			RES, FXD, FILM: 47 OHM, 5%, 0.25W	80009	315-0470-00
A54R73	315-0470-00			RES, FXD, FILM: 47 OHM, 5%, 0.25W	80009	315-0470-00
A54R75	315-0151-00			RES, FXD, FILM: 150 OHM, 5%, 0.25W	80009	315-0151-00
A54R83	315-0470-00			RES, FXD, FILM: 47 OHM, 5%, 0.25W	80009	315-0470-00
A54R84	301-0301-00			RES, FXD, FILM: 300 OHM, 5%, 0.5W	80009	301-0301-00
A54R86	315-0470-00			RES, FXD, FILM: 47 OHM, 5%, 0.25W	80009	315-0470-00
A55	311-1280-00			RES, VAR, NONW: TRMR, 1K OHM, 0.5W	80009	311-1280-00
A55	670-5007-00			CIRCUIT BD ASSY: IF LIMITER	80009	670-5007-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A55C5	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A55C9	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A55C14	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A55C18	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A55C24	283-0688-00		CAP,FXD,MICA DI:464PF,1%,300V	80009	283-0688-00
A55C34	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A55C44	283-0688-00		CAP,FXD,MICA DI:464PF,1%,300V	80009	283-0688-00
A55C54	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A55C64	283-0688-00		CAP,FXD,MICA DI:464PF,1%,300V	80009	283-0688-00
A55C69	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A55C74	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A55C84	283-0688-00		CAP,FXD,MICA DI:464PF,1%,300V	80009	283-0688-00
A55C87	290-0745-00		CAP,FXD,ELCTLT:22UF,+50-20%,25WVDC	24165	513D226M063BB4
A55C89	283-0203-00		CAP,FXD,CER DI:0.47UF,20%,50V	05397	C330C474M5U1CA
A55C94	283-0003-00		CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A55C98	290-0745-00		CAP,FXD,ELCTLT:22UF,+50-20%,25WVDC	24165	513D226M063BB4
A55CR11	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A55CR31	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A55CR61	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A55CR81	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A55L5	108-0262-00		COIL,RF:FIXED,505NH	80009	108-0262-00
A55L15	108-0736-00		COIL,RF:FIXED,828NH	TK2042	ORDER BY DESCR
A55L17	120-0382-00		COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A55L35	108-0262-00		COIL,RF:FIXED,505NH	80009	108-0262-00
A55L37	120-0382-00		COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A55L45	108-0736-00		COIL,RF:FIXED,828NH	TK2042	ORDER BY DESCR
A55L54	108-0262-00		COIL,RF:FIXED,505NH	80009	108-0262-00
A55L57	120-0382-00		COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A55L58	120-0382-00		COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A55L64	108-0736-00		COIL,RF:FIXED,828NH	TK2042	ORDER BY DESCR
A55L75	108-0262-00		COIL,RF:FIXED,505NH	80009	108-0262-00
A55L76	120-0382-00		COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A55L84	108-0736-00		COIL,RF:FIXED,828NH	TK2042	ORDER BY DESCR
A55Q2	151-0190-00		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A55Q9	151-0472-00		TRANSISTOR,SIG:BIPOLAR,NPN;14V,80MA,1.0GHZ, AMPLIFIER;NE41632B,TO-92 EBC	80009	151-0472-00
A55Q15	151-0472-00		TRANSISTOR,SIG:BIPOLAR,NPN;14V,80MA,1.0GHZ, AMPLIFIER;NE41632B,TO-92 EBC	80009	151-0472-00
A55Q21	151-0190-00		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A55Q22	151-0472-00		TRANSISTOR,SIG:BIPOLAR,NPN;14V,80MA,1.0GHZ, AMPLIFIER;NE41632B,TO-92 EBC	80009	151-0472-00
A55Q32	151-0190-00		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A55Q35	151-0472-00		TRANSISTOR,SIG:BIPOLAR,NPN;14V,80MA,1.0GHZ, AMPLIFIER;NE41632B,TO-92 EBC	80009	151-0472-00
A55Q41	151-0190-00		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Discont.	Name & Description	Mfr. Code	Mfr. Part No.
A55Q43	151-0472-00		TRANSISTOR, SIG: BIPOLAR, NPN; 14V, 80MA, 1.0GHZ, AMPLIFIER; NE41632B, TO-92 EBC	80009	151-0472-00
A55Q52	151-0190-00		TRANSISTOR, SIG: BIPOLAR, NPN; 40V, 200MA, 300MHZ , AMPLIFIER; 2N3904, TO-92 EBC	80009	151-0190-00
A55Q55	151-0472-00		TRANSISTOR, SIG: BIPOLAR, NPN; 14V, 80MA, 1.0GHZ, AMPLIFIER; NE41632B, TO-92 EBC	80009	151-0472-00
A55Q60	151-0190-00		TRANSISTOR, SIG: BIPOLAR, NPN; 40V, 200MA, 300MHZ , AMPLIFIER; 2N3904, TO-92 EBC	80009	151-0190-00
A55Q62	151-0472-00		TRANSISTOR, SIG: BIPOLAR, NPN; 14V, 80MA, 1.0GHZ, AMPLIFIER; NE41632B, TO-92 EBC	80009	151-0472-00
A55Q75	151-0472-00		TRANSISTOR, SIG: BIPOLAR, NPN; 14V, 80MA, 1.0GHZ, AMPLIFIER; NE41632B, TO-92 EBC	80009	151-0472-00
A55Q81	151-0190-00		TRANSISTOR, SIG: BIPOLAR, NPN; 40V, 200MA, 300MHZ , AMPLIFIER; 2N3904, TO-92 EBC	80009	151-0190-00
A55Q90	151-0190-00		TRANSISTOR, SIG: BIPOLAR, NPN; 40V, 200MA, 300MHZ , AMPLIFIER; 2N3904, TO-92 EBC	80009	151-0190-00
A55Q92	151-0472-00		TRANSISTOR, SIG: BIPOLAR, NPN; 14V, 80MA, 1.0GHZ, AMPLIFIER; NE41632B, TO-92 EBC	80009	151-0472-00
A55R1	315-0362-00		RES, FXD, FILM: 3.6K OHM, 5%, 0.25W	80009	315-0362-00
A55R2	322-3126-00		RES, FXD, FILM: 200 OHM, 1%, 0.2W, TC=TO	80009	322-3126-00
A55R4	322-3147-00		RES, FXD, FILM: 332 OHM, 1%, 0.2W, TC=TO	80009	322-3147-00
A55R5	315-0101-00		RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A55R8	315-0101-00		RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A55R11	322-3126-00		RES, FXD, FILM: 200 OHM, 1%, 0.2W, TC=TO	80009	322-3126-00
A55R12	315-0471-00		RES, FXD, FILM: 470 OHM, 5%, 0.25W	80009	315-0471-00
A55R15	322-3051-00		RES, FXD, FILM: 33.2 OHM, 1%, 0.2W, TC=TO	57668	CRB20FXE301K
A55R18	315-0102-00		RES, FXD, FILM: 1K OHM, 5%, 0.25W	80009	315-0102-00
A55R19	321-0068-00		RES, FXD, FILM: 49.9 OHM, 0.1%, 0.125W, TC=TO	80009	321-0068-00
A55R21	315-0362-00		RES, FXD, FILM: 3.6K OHM, 5%, 0.25W	80009	315-0362-00
A55R22	322-3126-00		RES, FXD, FILM: 200 OHM, 1%, 0.2W, TC=TO	80009	322-3126-00
A55R24	315-0101-00		RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A55R25	315-0471-00		RES, FXD, FILM: 470 OHM, 5%, 0.25W	80009	315-0471-00
A55R26	322-3147-00		RES, FXD, FILM: 332 OHM, 1%, 0.2W, TC=TO	80009	322-3147-00
A55R30	311-1280-00		RES, VAR, NONWW: TRMR, 1K OHM, 0.5W	80009	311-1280-00
A55R31	315-0471-00		RES, FXD, FILM: 470 OHM, 5%, 0.25W	80009	315-0471-00
A55R34	322-3051-00		RES, FXD, FILM: 33.2 OHM, 1%, 0.2W, TC=TO	57668	CRB20FXE301K
A55R35	315-0101-00		RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A55R41	322-3126-00		RES, FXD, FILM: 200 OHM, 1%, 0.2W, TC=TO	80009	322-3126-00
A55R45	315-0101-00		RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A55R46	315-0471-00		RES, FXD, FILM: 470 OHM, 5%, 0.25W	80009	315-0471-00
A55R47	322-3147-00		RES, FXD, FILM: 332 OHM, 1%, 0.2W, TC=TO	80009	322-3147-00
A55R50	311-1280-00		RES, VAR, NONWW: TRMR, 1K OHM, 0.5W	80009	311-1280-00
A55R51	315-0362-00		RES, FXD, FILM: 3.6K OHM, 5%, 0.25W	80009	315-0362-00
A55R52	322-3126-00		RES, FXD, FILM: 200 OHM, 1%, 0.2W, TC=TO	80009	322-3126-00
A55R57	315-0101-00		RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A55R61	315-0471-00		RES, FXD, FILM: 470 OHM, 5%, 0.25W	80009	315-0471-00
A55R62	322-3126-00		RES, FXD, FILM: 200 OHM, 1%, 0.2W, TC=TO	80009	322-3126-00
A55R64	322-3051-00		RES, FXD, FILM: 33.2 OHM, 1%, 0.2W, TC=TO	57668	CRB20FXE301K
A55R65	315-0471-00		RES, FXD, FILM: 470 OHM, 5%, 0.25W	80009	315-0471-00
A55R70	322-3239-00		RES, FXD, FILM: 3.01K OHM, 1%, 0.2W, TC=TO	57668	CRB20 FXE 3K01
A55R71	322-3126-00		RES, FXD, FILM: 200 OHM, 1%, 0.2W, TC=TO	80009	322-3126-00
A55R73	315-0101-00		RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A55R74	322-3147-00		RES, FXD, FILM: 332 OHM, 1%, 0.2W, TC=TO	80009	322-3147-00
A55R75	315-0101-00		RES, FXD, FILM: 100 OHM, 5%, 0.25W	80009	315-0101-00
A55R80	322-3164-00		RES, FXD, FILM: 499 OHM, 1%, 0.2W, TC=TO	57668	CRB20 FXE 499E
A55R81	315-0471-00		RES, FXD, FILM: 470 OHM, 5%, 0.25W	80009	315-0471-00
A55R82	322-3126-00		RES, FXD, FILM: 200 OHM, 1%, 0.2W, TC=TO	80009	322-3126-00
A55R84	322-3051-00		RES, FXD, FILM: 33.2 OHM, 1%, 0.2W, TC=TO	57668	CRB20FXE301K
A55R94	315-0510-00		RES, FXD, FILM: 51 OHM, 5%, 0.25W	80009	315-0510-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A55R95	315-0471-00			RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A56	670-5194-07			CIRCUIT BD ASSY:CONVERTER CONTROL (OPTION 03 ONLY)	80009	670-5194-07
A56	670-5194-01	B020000	B020233	CIRCUIT BD ASSY:CONVERTER CONTROL (OPTION 01 ONLY)	80009	670-5194-01
A56	670-5194-08	B020234		CIRCUIT BD ASSY:CONVERTER CONTROL (OPTION 02 ONLY)	80009	670-5194-08
A56	670-5194-02	B020000	B020233	CIRCUIT BD ASSY:CONVERTER CONTROL	80009	670-5194-02
A56	670-5194-09	B020234		CKT BD SUBASSY:CONVERTER CONTROL (OPTION 02 ONLY)	80009	670-5194-09
A56C3	283-0637-00	B020000	B020233	CAP,FXD,MICA DI:20PF,2.5%,500V	80009	283-0637-00
A56C3	283-0663-00	B020234		CAP,FXD,MICA DI:16.8PF,+/-0.5PF,500V	80009	283-0663-00
A56C5	283-0615-00			CAP,FXD,MICA DI:33PF,5%,500V	80009	283-0615-00
A56C13	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A56C15	283-0615-00			CAP,FXD,MICA DI:33PF,5%,500V	80009	283-0615-00
A56C30	283-0706-00			CAP,FXD,MICA DI:91PF,1%,500V	80009	283-0706-00
A56C31	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A56C35	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A56C37	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A56C46	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A56C51	283-0644-00			CAP,FXD,MICA DI:150PF,1%,500V	80009	283-0644-00
A56C61	283-0706-00			CAP,FXD,MICA DI:91PF,1%,500V	80009	283-0706-00
A56C70	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A56C73	283-0644-00			CAP,FXD,MICA DI:150PF,1%,500V	80009	283-0644-00
A56C76	283-0114-00			CAP,FXD,CER DI:1500PF,5%,200V	80009	283-0114-00
A56C78	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A56C84	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A56C85	290-0535-00			CAP,FXD,ELCTLT:33UF,20%,10V TANTALUM	24165	196D336X0010KA1
A56C88	290-0745-00			CAP,FXD,ELCTLT:22UF,+50-20%,25WVDC	24165	513D226M063BB4
A56CR62	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A56CR94	152-0141-02			DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A56L13	108-0436-00			COIL,RF:FIXED,240UH ON FORM (OPTION 03 ONLY)	80009	108-0436-00
A56L13	108-0413-00			COIL,RF:FIXED,0.4UH (OPTION 01 & 02)	80009	108-0413-00
A56L14	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A56L14	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A56L50	108-0443-00			COIL,RF:FIXED,23.5UH	80009	108-0443-00
A56L60	108-0443-00			COIL,RF:FIXED,23.5UH	80009	108-0443-00
A56L76	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A56L76	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A56LR3	108-0408-00			COIL,RF:FIXED,91NH (OPTION 01,02 & 03)	80009	108-0408-00
A56LR12	108-0543-00			COIL,RF:FIXED,1.1UH	TK1345	108-0543-00
A56Q2	151-0333-00			TRANSISTOR,SIG:BIPOLAR,NPN;15V,50MA,650MHZ,AMPLIFIER;MPS918/MPS3563,TO-92 EBC	80009	151-0333-00
A56Q35	151-0333-00			TRANSISTOR,SIG:BIPOLAR,NPN;15V,50MA,650MHZ,AMPLIFIER;MPS918/MPS3563,TO-92 EBC	80009	151-0333-00
A56Q55	151-1054-00			TRANSISTOR,SIG:JFET,N-CH;3.5V,5MA,1MS,VGS(1-2)<0.1V,DUAL;TO-71	80009	151-1054-00
A56Q74	151-0192-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A56Q91	151-0192-00			TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A56Q92	151-0127-00			TRANSISTOR,SIG:BIPOLAR,NPN;15V,200MA,SWITCH ING;2N2369,TO-18	80009	151-0127-00
A56Q95	151-0219-00			TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A56R4	315-0511-00			RES,FXD,FILM:510 OHM,5%,0.25W	80009	315-0511-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A56R6	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A56R10	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A56R11	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A56R16	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A56R21	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A56R25	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A56R31	315-0511-00			RES,FXD,FILM:510 OHM,5%,0.25W	80009	315-0511-00
A56R32	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A56R34	315-0302-00			RES,FXD,FILM:3K OHM,5%,0.25W	80009	315-0302-00
A56R35	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A56R36	315-0510-00			RES,FXD,FILM:51 OHM,5%,0.25W	80009	315-0510-00
A56R43	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A56R45	315-0302-00			RES,FXD,FILM:3K OHM,5%,0.25W	80009	315-0302-00
A56R52	315-0511-00			RES,FXD,FILM:510 OHM,5%,0.25W	80009	315-0511-00
A56R53	315-0511-00			RES,FXD,FILM:510 OHM,5%,0.25W	80009	315-0511-00
A56R63	322-3322-00			RES,FXD,FILM:22.1K OHM,1%,0.2W,TC=TO	80009	322-3322-00
A56R71	315-0272-00			RES,FXD,FILM:2.7K OHM,5%,0.25W	80009	315-0272-00
A56R72	315-0513-00			RES,FXD,FILM:51K OHM,5%,0.25W	80009	315-0513-00
A56R73	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A56R76	315-0153-00			RES,FXD,FILM:15K OHM,5%,0.25W	80009	315-0153-00
A56R80	315-0511-00			RES,FXD,FILM:510 OHM,5%,0.25W	80009	315-0511-00
A56R81	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A56R82	315-0472-00			RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A56R83	315-0183-00			RES,FXD,FILM:18K OHM,5%,0.25W	80009	315-0183-00
A56R84	315-0242-00			RES,FXD,FILM:2.4K OHM,5%,0.25W	80009	315-0242-00
A56R85	322-3073-00			RES,FXD,FILM:56.2 OHM,1%,0.2W,TC=TO	80009	322-3073-00
A56R87	322-3287-00			RES,FXD,FILM:9.53K OHM,1%,0.2W,TC=TO	80009	322-3287-00
A56R88	322-3262-00			RES,FXD,FILM:5.23K OHM,1%,0.2W,TC=TO	80009	322-3262-00
A56U22	156-0130-02	B020000	8020699	IC,MISC:	80009	156-0130-02
A56U22	156-0130-00	B020700		IC,MISC:BIPOLAR,MODULATOR/DEMULATOR;BALAN CED;MC1496G/LM1496H,TO-100	80009	156-0130-00
A56Y18	158-0150-00			XTAL UNIT,QTZ:70 MHZ,0.01%,SERIES (OPTION 03 ONLY)	80009	158-0150-00
A56Y18	158-0164-00			XTAL UNIT,QTZ:61.250MHZ,0.01%,SERIES (OPTION 01 ONLY)	80009	158-0164-00
A56Y18	158-0178-00			XTAL UNIT,QTZ:63.150MHZ,0.01%,SERIES (OPTION 02 ONLY)	80009	158-0178-00
A57	670-5196-07			CIRCUIT BD ASSY:CONVERTER OSC (OPTION 01 & 02)	80009	670-5196-07
A57	670-5196-06			CIRCUIT BD ASSY:CONVERTER OSC (OPTION 03 ONLY)	80009	670-5196-06
A57C6	281-0651-00			CAP,FXD,CER DI:47PF,5%,200V	80009	281-0651-00
A57C7	281-0552-00			CAP,FXD,CER DI:25PF,5%,500V	80009	281-0552-00
A57C8	283-0602-00			CAP,FXD,MICA DI:53PF,5%,300V	80009	283-0602-00
A57C14	283-0630-00			CAP,FXD,MICA DI:110PF,1%,100V	80009	283-0630-00
A57C15	283-0630-00			CAP,FXD,MICA DI:110PF,1%,100V	80009	283-0630-00
A57C21	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A57C25	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A57C28	283-0067-00			CAP,FXD,CER DI:0.001UF,10%,200V	51406	
A57C30	283-0633-00			CAP,FXD,MICA DI:77PF,1%,100V (OPTION 01 & 02)	80009	283-0633-00
A57C30	283-0629-00			CAP,FXD,MICA DI:62PF,1%,500V (OPTION 03 ONLY)	80009	283-0629-00
A57C36	283-0114-00			CAP,FXD,CER DI:1500PF,5%,200V	80009	283-0114-00
A57C45	290-0745-00			CAP,FXD,ELCTLT:22UF,+50-20%,25WVDC	24165	513D226M063BB4
A57C52	283-0635-00			CAP,FXD,MICA DI:51PF,1%,500V (OPTION 03 ONLY)	80009	283-0635-00
A57C53	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A57C55	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A57C63	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A57C66	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A57C73	283-0644-00		CAP,FXD,MICA DI:150PF,1%,500V (OPTION 03 ONLY)	80009	283-0644-00
A57C73	283-0646-00		CAP,FXD,MICA DI:170PF,1%,100V (OPTION 01 & 02)	80009	283-0646-00
A57C77	283-0635-00		CAP,FXD,MICA DI:51PF,1%,500V	80009	283-0635-00
A57C83	283-0706-00		CAP,FXD,MICA DI:91PF,1%,500V (OPTION 01 & 02)	80009	283-0706-00
A57C83	283-0634-00		CAP,FXD,MICA DI:65PF,1%,100V (OPTION 03 ONLY)	80009	283-0634-00
A57C84	281-0092-00		CAP,VAR,CER DI:9-35PF,200V	80009	281-0092-00
A57CR9	152-0665-00		SEMICOND DVC,DI:VVC,S1,30V,A276	25088	BB1096
A57L3	114-0370-00		COIL,RF:VARIABLE,220-400NH	80009	114-0370-00
A57L3	114-0373-00		COIL,RF:VARIABLE,290-540NH (OPTION 01 & 02)	80009	114-0373-00
A57L18	108-0897-00		COIL,RF:FIXED,230UH,30%	80009	108-0897-00
A57L31	108-0262-00		COIL,RF:FIXED,505NH	80009	108-0262-00
A57L41	114-0302-00		COIL,RF:VARIABLE,140-290NH	80009	114-0302-00
A57L82	108-0260-00		COIL,RF:FIXED,98NH	TK2042	ORDER BY DESCR
A57L86	108-0413-00		COIL,RF:FIXED,0.4UH	80009	108-0413-00
A57LR13	108-0408-00		COIL,RF:FIXED,91NH	80009	108-0408-00
A57LR56	108-0520-00		COIL,RF:FIXED,2.2UH	80009	108-0520-00
A57LR72	108-0328-00		COIL,RF:FIXED,275UH	TK1345	108-0328-00
A57Q22	151-0333-00		TRANSISTOR,SIG:BIPOLAR,NPN;15V,50MA,650MHZ, AMPLIFIER;MPS918/MPS3563,TO-92 EBC	80009	151-0333-00
A57Q32	151-0333-00		TRANSISTOR,SIG:BIPOLAR,NPN;15V,50MA,650MHZ, AMPLIFIER;MPS918/MPS3563,TO-92 EBC	80009	151-0333-00
A57Q35	151-0219-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,50MA,40MHZ,A MPLIFIER;MPS4250,TO-92 EBC	80009	151-0219-00
A57Q62	151-0472-00		TRANSISTOR,SIG:BIPOLAR,NPN;14V,80MA,1.0GHZ, AMPLIFIER;NE41632B,TO-92 EBC	80009	151-0472-00
A57R11	315-0272-00		RES,FXD,FILM:2.7K OHM,5%,0.25W	80009	315-0272-00
A57R12	315-0332-00		RES,FXD,FILM:3.3K OHM,5%,0.25W	80009	315-0332-00
A57R21	315-0470-00		RES,FXD,FILM:47 OHM,5%,0.25W	80009	315-0470-00
A57R23	315-0152-00		RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A57R26	315-0472-00		RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A57R27	315-0153-00		RES,FXD,FILM:15K OHM,5%,0.25W	80009	315-0153-00
A57R46	315-0472-00		RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A57R53	315-0470-00		RES,FXD,FILM:47 OHM,5%,0.25W	80009	315-0470-00
A57R61	315-0471-00		RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A57R65	315-0620-00		RES,FXD,FILM:62 OHM,5%,0.25W	80009	315-0620-00
A57R71	315-0222-00		RES,FXD,FILM:2.2K OHM,5%,0.25W	80009	315-0222-00
A57R73	315-0180-00		RES,FXD,FILM:18 OHM,5%,0.25W	80009	315-0180-00
A57R74	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A57R75	315-0271-00		RES,FXD,FILM:270 OHM,5%,0.25W	80009	315-0271-00
A58	670-5195-00		CIRCUIT BD ASSY:PHASE LOCK SWITCH	80009	670-5195-00
A58C67	283-0024-00		CAP,FXD,CER DI:0.1UF,+80-20%,50V	05397	C330C10YZ5U1CA
A58C68	283-0024-00		CAP,FXD,CER DI:0.1UF,+80-20%,50V	05397	C330C10YZ5U1CA
A58C69	283-0024-00		CAP,FXD,CER DI:0.1UF,+80-20%,50V	05397	C330C10YZ5U1CA
A58C76	283-0024-00		CAP,FXD,CER DI:0.1UF,+80-20%,50V	05397	C330C10YZ5U1CA
A58C77	283-0024-00		CAP,FXD,CER DI:0.1UF,+80-20%,50V	05397	C330C10YZ5U1CA
A58C79	283-0024-00		CAP,FXD,CER DI:0.1UF,+80-20%,50V	05397	C330C10YZ5U1CA
A58C89	283-0024-00		CAP,FXD,CER DI:0.1UF,+80-20%,50V	05397	C330C10YZ5U1CA
A58CR51	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A58CR76	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A58CR77	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02



Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A58CR78	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A58CR79	152-0141-02			DIODE,SIG:ULTRA FAST;40V,150MA,4NS,2PF;1N4152,DO-35,T&R	80009	152-0141-02
A58L67	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A58L67	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A58L74	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A58L74	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A58L75	120-0382-00	B020000	B020617	COIL,RF:210UH,+28%-43%,14 TURNS,TEST COND. 10 KHZ, 0.115 MA,	TK1345	120-0382-00
A58L75	120-0382-01	B020618		COIL,RF:210UH,+28/-43%,14 TURNS	TK1345	120-0382-01
A58R52	315-0203-00			RES,FXD,FILM:20K OHM,5%,0.25W	80009	315-0203-00
A58R53	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A58R57	301-0681-00			RES,FXD,FILM:680 OHM,5%,0.5W	01121	EB6815
A58R61	315-0512-00			RES,FXD,FILM:5.1K OHM,5%,0.25W	80009	315-0512-00
A58R67	315-0682-00			RES,FXD,FILM:6.8K OHM,5%,0.25W	80009	315-0682-00
A58R68	315-0682-00			RES,FXD,FILM:6.8K OHM,5%,0.25W	80009	315-0682-00
A58R76	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A58R77	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A58S22	263-0021-01			SWITCH PB ASSY:4 LCH,7.5MM,6 CONTACTS	80009	263-0021-01
A58S25	263-0015-04			SWITCH PB ASSY:2 LCH,7.5MM,2 CONTACTS	80009	263-0015-04
A58S28	263-0015-05			SWITCH PB ASSY:2 LCH,7.5MM,2 CONTACTS	80009	263-0015-05
A59	670-5021-01			CIRCUIT BD ASSY:PHASE LOCK INTERFACE	80009	670-5021-01
A59C4	290-0745-00			CAP,FXD,ELCTLT:22UF,+50-20%,25WVDC	24165	513D226M063BB4
A59C6	290-0745-00			CAP,FXD,ELCTLT:22UF,+50-20%,25WVDC	24165	513D226M063BB4
A59C55	283-0353-00			CAP,FXD,CER DI:0.1UF,10%,50V	04222	1210C104KAT050L
A59C56	283-0353-00			CAP,FXD,CER DI:0.1UF,10%,50V	04222	1210C104KAT050L
A59C57	283-0353-00			CAP,FXD,CER DI:0.1UF,10%,50V	04222	1210C104KAT050L
A59W50	175-2076-01			CABLE ASSY,RF:50 OHM COAX,3.375 L	80009	175-2076-01
A59W52	175-2077-01			CABLE ASSY,RF:50 OHM COAX,6.438 L	80009	175-2077-01
A59W56	175-2075-01			CABLE ASSY,RF:50 OHM COAX,3.375 L	80009	175-2075-01
A59W57	175-2107-01			CABLE ASSY,RF:50 OHM COAX,3.3 L	80009	175-2107-01
A60	670-5022-01	B020000	B020554	CIRCUIT BD ASSY:AGC LOGIC	80009	670-5022-01
A60	670-5022-03	B020555	B020674	CIRCUIT BD ASSY:AGC LOGIC	80009	670-5022-03
A60	670-5022-05	B020675		CIRCUIT BD ASSY:AGC LOGIC	80009	670-5022-05
A60C5	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A60C11	283-0191-00			CAP,FXD,CER DI:0.022UF,20%,50V	05397	C320C223M5U1CA
A60C12	290-0770-00			CAP,FXD,ELCTLT:100UF,+50-20%,25VDC	54473	ECE-A25V100L
A60C13	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A60C14	283-0028-00			CAP,FXD,CER DI:0.0022UF,20%,50V	80009	283-0028-00
A60C15	283-0103-00			CAP,FXD,CER DI:180PF,5%,500V	80009	283-0103-00
A60C16	283-0203-00			CAP,FXD,CER DI:0.47UF,20%,50V	05397	C330C474M5U1CA
A60C17	290-0536-00			CAP,FXD,ELCTLT:10UF,20%,25V TANTALUM	05397	T368B106M025AS
A60C20	283-0672-00			CAP,FXD,MICA DI:200PF,1%,500V	80009	283-0672-00
A60C21	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A60C22	290-0536-00			CAP,FXD,ELCTLT:10UF,20%,25V TANTALUM	05397	T368B106M025AS
A60C23	290-0536-00			CAP,FXD,ELCTLT:10UF,20%,25V TANTALUM	05397	T368B106M025AS
A60C24	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A60C25	283-0167-00	670-5022-01	670-5022-01	CAP,FXD,CER DI:0.1UF,10%,100V	80009	283-0167-00
A60C25	283-0339-00	670-5523-03		CAP,FXD,CER DI:0.22UF,10%,50V	04222	SR305C224KAA
A60C26	283-0785-00			CAP,FXD,MICA DI:250PF,1%,500V	80009	283-0785-00
A60C27	283-0191-00			CAP,FXD,CER DI:0.022UF,20%,50V	05397	C320C223M5U1CA
A60C28	283-0598-00			CAP,FXD,MICA DI:253PF,5%,500V	80009	283-0598-00
A60C29	283-0728-00			CAP,FXD,MICA DI:120PF,1%,500V	80009	283-0728-00
A60C30	283-0114-00			CAP,FXD,CER DI:1500PF,5%,200V	80009	283-0114-00
A60C31	283-0111-00			CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A60C38	283-0601-00			CAP,FXD,MICA DI:22PF,10%,300V	80009	283-0601-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective Discnt	Name & Description	Mfr. Code	Mfr. Part No.
A60C39	283-0032-00		CAP,FXD,CER DI:470PF,5%,500V	80009	283-0032-00
A60C40	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A60C42	285-0598-00		CAP,FXD,PLASTIC:0.01UF,5%,100V	19396	DU490B103J
A60C43	283-0032-00		CAP,FXD,CER DI:470PF,5%,500V	80009	283-0032-00
A60C45	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A60C54	283-0142-00		CAP,FXD,CER DI:0.0027UF,5%,200V	80009	283-0142-00
A60C60	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A60C61	283-0659-00		CAP,FXD,MICA DI:1160PF,2%,500V	80009	283-0659-00
A60C62	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A60C63	283-0689-00		CAP,FXD,MICA DI:550PF,1%,300V	80009	283-0689-00
A60C67	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A60C68	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A60C71	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A60C78	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A60C88	290-0526-00		CAP,FXD,ELCTLT:6.8UF,20%,6.0/6.3VDC	05397	T368A685M006AS
A60C97	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A60C98	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A60CR2	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR9	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR16	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR19	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR32	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR34	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR37	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR54	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR55	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR61	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR62	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR63	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR64	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR65	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR66	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR67	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR68	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR69	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR77	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR78	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02
A60CR79	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,DO-35,T&R	80009	152-0141-02

Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Discont	Name & Description	Mfr. Code	Mfr. Part No.
A60CR88	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A60CR98	152-0141-02		DIODE, SIG: , ULTRA FAST; 40V, 150MA, 4NS, 2PF; 1N4 152, DO-35, T&R	80009	152-0141-02
A60K97	148-0081-00		RELAY, ARMATURE: 2 FORM C, MULTI, 28VDC, COIL 12 VDC 1000 OHM	77342	R10-E2434-1
A60L28	114-0311-00		COIL, RF: VARIABLE, 65-190UH	80009	114-0311-00
A60L38	114-0219-00		COIL, RF: VARIABLE, 45-130UH	80009	114-0219-00
A60Q9	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A60Q11	151-0301-00		TRANSISTOR, SIG: BIPOLAR, PNP; 60V, 600MA, 200MHZ , AMPLIFIER; 2N2907A, TO-18	80009	151-0301-00
A60Q12	151-0302-00		TRANSISTOR, SIG: BIPOLAR, NPN; 40V, 800MA, 300MHZ , AMPLIFIER; 2N2222A, TO-18	80009	151-0302-00
A60Q13	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A60Q14	151-1005-02		TRANSISTOR, SIG: JFET, N-CH; 5V, 6MA, 2MS, 500 OHM ; 2N4303, TO-92, CHK	80009	151-1005-02
A60Q17	151-0302-00		TRANSISTOR, SIG: BIPOLAR, NPN; 40V, 800MA, 300MHZ , AMPLIFIER; 2N2222A, TO-18	80009	151-0302-00
A60Q20	151-0127-00		TRANSISTOR, SIG: BIPOLAR, NPN; 15V, 200MA, SWITCH ING; 2N2369, TO-18	80009	151-0127-00
A60Q36	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A60Q37	151-0219-00		TRANSISTOR, SIG: BIPOLAR, PNP; 40V, 50MA, 40MHZ, A MPLIFIER; MPS4250, TO-92 EBC	80009	151-0219-00
A60Q51	151-0302-00		TRANSISTOR, SIG: BIPOLAR, NPN; 40V, 800MA, 300MHZ , AMPLIFIER; 2N2222A, TO-18	80009	151-0302-00
A60Q89	151-0281-00		TRANSISTOR, NPN, SI, 400 MILLIWATTS	80009	151-0281-00
A60R1	315-0472-00		RES, FXD, FILM: 4.7K OHM, 5%, 0.25W	80009	315-0472-00
A60R2	321-0321-00		RES, FXD, FILM: 21.5K OHM, 1%, 0.125W, TC=TO	07716	CEAD21501F
A60R3	321-0891-00		RES, FXD, FILM: 800K OHM, 1%, 0.125W, TC=TO	80009	321-0891-00
A60R4	315-0103-00		RES, FXD, FILM: 10K OHM, 5%, 0.25W	80009	315-0103-00
A60R5	315-0104-00		RES, FXD, FILM: 100K OHM, 5%, 0.25W	80009	315-0104-00
A60R6	322-3289-00		RES, FXD, FILM: 10K OHM, 1%, 0.2W, TC=TO	80009	322-3289-00
A60R7	322-3172-00		RES, FXD, FILM: 604 OHM, 1%, 0.2W, TC=TO	57668	CRB20 FXE 604E
A60R8	322-3193-00		RES, FXD, FILM: 1K OHM, 1%, 0.2W, TC=TO	57668	CRB20 FXE 1K00
A60R9	322-3281-00		RES, FXD, FILM: 8.25K OHM, 1%, 0.2W, TC=TO	80009	322-3281-00
A60R10	315-0752-00		RES, FXD, FILM: 7.5K OHM, 5%, 0.25W	80009	315-0752-00
A60R11	315-0100-00		RES, FXD, FILM: 10 OHM, 5%, 0.25W	19701	5043CX10RR00J
A60R12	301-0201-00		RES, FXD, FILM: 200 OHM, 5%, 0.5W	80009	301-0201-00
A60R13	315-0203-00		RES, FXD, FILM: 20K OHM, 5%, 0.25W	80009	315-0203-00
A60R14	315-0302-00		RES, FXD, FILM: 3K OHM, 5%, 0.25W	80009	315-0302-00
A60R15	315-0683-00	670-5022-01 670-5022-01	RES, FXD, FILM: 68K OHM, 5%, 0.25W	80009	315-0683-00
A60R15	315-0473-00	670-5022-03	RES, FXD, FILM: 47K OHM, 5%, 0.25W	80009	315-0473-00
A60R16	315-0302-00		RES, FXD, FILM: 3K OHM, 5%, 0.25W	80009	315-0302-00
A60R17	311-1226-00		RES, VAR, NONWW: TRMR, 2.5K OHM, 0.5W	32997	3386F-1-252
A60R18	315-0103-00		RES, FXD, FILM: 10K OHM, 5%, 0.25W	80009	315-0103-00
A60R19	322-3260-00		RES, FXD, FILM: 4.99K OHM, 1%, 0.2W, TC=TO	57668	CRB20 FXE 4K99
A60R20	321-0263-00		RES, FXD, FILM: 5.36K OHM, 1%, 0.125W, TC=TO	07716	CEAD53600F
A60R21	315-0512-00		RES, FXD, FILM: 5.1K OHM, 5%, 0.25W	80009	315-0512-00
A60R22	315-0512-00		RES, FXD, FILM: 5.1K OHM, 5%, 0.25W	80009	315-0512-00
A60R23	315-0103-00		RES, FXD, FILM: 10K OHM, 5%, 0.25W	80009	315-0103-00
A60R24	315-0472-00		RES, FXD, FILM: 4.7K OHM, 5%, 0.25W	80009	315-0472-00
A60R25	315-0684-00		RES, FXD, FILM: 680K OHM, 5%, 0.25W	01121	CB6845
A60R26	315-0512-00		RES, FXD, FILM: 5.1K OHM, 5%, 0.25W	80009	315-0512-00
A60R27	315-0103-00		RES, FXD, FILM: 10K OHM, 5%, 0.25W	80009	315-0103-00
A60R28	315-0331-00		RES, FXD, FILM: 330 OHM, 5%, 0.25W	80009	315-0331-00
A60R29	315-0472-00		RES, FXD, FILM: 4.7K OHM, 5%, 0.25W	80009	315-0472-00

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A60R30	315-0205-00		RES,FXD,FILM:2M OHM,5%,0.25W	80009	315-0205-00
A60R31	315-0392-00		RES,FXD,FILM:3.9K OHM,5%,0.25W	80009	315-0392-00
A60R32	321-0241-00		RES,FXD,FILM:3.16K OHM,1%,0.125W,TC=T0	07716	CEAD31600F
A60R33	311-1228-00		RES,VAR,NONWW:TRMR,10K OHM,0.5W	32997	3386F-1-103
A60R34	322-3335-00		RES,FXD,FILM:30.1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 30K1
A60R35	322-3414-00		RES,FXD,FILM:200K OHM,1%,0.2W,TC=T0	91637	CCF501620002F
A60R36	322-3239-00		RES,FXD,FILM:3.01K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 3K01
A60R37	322-3176-00		RES,FXD,FILM:665 OHM,1%,0.2W,TC=T0	91637	CCF50-2
A60R38	322-3191-00		RES,FXD,FILM:953 OHM,1%,0.2W,TC=T0	80009	322-3191-00
A60R39	315-0303-00		RES,FXD,FILM:30K OHM,5%,0.25W	80009	315-0303-00
A60R40	315-0122-00		RES,FXD,FILM:1.2K OHM,5%,0.25W	80009	315-0122-00
A60R41	322-3357-00		RES,FXD,FILM:51.1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 51K1
A60R42	315-0302-00		RES,FXD,FILM:3K OHM,5%,0.25W	80009	315-0302-00
A60R43	315-0302-00		RES,FXD,FILM:3K OHM,5%,0.25W	80009	315-0302-00
A60R44	131-0566-00		BUS,CONDUCTOR:DUMMY RES,0.094 OD X 0.225 L	24546	OMA 07
A60R45	315-0302-00		RES,FXD,FILM:3K OHM,5%,0.25W	80009	315-0302-00
A60R46	315-0204-00		RES,FXD,FILM:200K OHM,5%,0.25W	80009	315-0204-00
A60R47	311-1228-00		RES,VAR,NONWW:TRMR,10K OHM,0.5W	32997	3386F-1-103
A60R48	322-3210-00		RES,FXD,FILM:1.5K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K50
A60R49	322-3193-00		RES,FXD,FILM:1K OHM,1%,0.2W,TC=T0	57668	CRB20 FXE 1K00
A60R50	315-0472-00		RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A60R51	315-0472-00		RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A60R52	315-0103-00		RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A60R53	315-0202-00		RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A60R54	315-0202-00		RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A60R55	311-1223-00		RES,VAR,NONWW:TRMR,250 OHM,0.5W	32997	3386F-1-251
A60R56	322-3276-00		RES,FXD,FILM:7.32K OHM,1%,0.2W,TC=T0	80009	322-3276-00
A60R57	311-1223-00		RES,VAR,NONWW:TRMR,250 OHM,0.5W	32997	3386F-1-251
A60R58	311-1224-00		RES,VAR,NONWW:TRMR,500 OHM,0.5W	32997	3386F-1-501
A60R59	311-1224-00		RES,VAR,NONWW:TRMR,500 OHM,0.5W	32997	3386F-1-501
A60R60	322-3344-00		RES,FXD,FILM:37.4K OHM,1%,0.2W,TC=T0	80009	322-3344-00
A60R61	322-3344-00		RES,FXD,FILM:37.4K OHM,1%,0.2W,TC=T0	80009	322-3344-00
A60R62	315-0331-00		RES,FXD,FILM:330 OHM,5%,0.25W	80009	315-0331-00
A60R63	315-0105-00		RES,FXD,FILM:1M OHM,5%,0.25W	80009	315-0105-00
A60R64	321-0603-07		RES,FXD,FILM:15K OHM,0.1%,0.125W,TC=T9	80009	321-0603-07
A60R65	321-0685-00		RES,FXD,FILM:30K OHM,0.5%,0.125W,TC=T2	80009	321-0685-00
A60R66	321-0720-03		RES,FXD,FILM:60K OHM,0.125%,0.125W,TC=T2	07716	CEA 60 KOHM 0.25
A60R67	322-3393-00		RES,FXD,FILM:121K OHM,1%,0.2W,TC=T0	80009	322-3393-00
A60R68	321-0422-00		RES,FXD,FILM:243K OHM,1%,0.125W,TC=T0	07716	CEAD24302F
A60R69	321-0451-00		RES,FXD,FILM:487K OHM,1%,0.125W,TC=T0	80009	321-0451-00
A60R73	315-0134-00		RES,FXD,FILM:130K OHM,5%,0.25W	80009	315-0134-00
A60R74	315-0395-00		RES,FXD,FILM:3.9M OHM,5%,0.25W	01121	CB3955
A60R75	315-0152-00		RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A60R76	315-0152-00		RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A60R76	315-0303-00		RES,FXD,FILM:30K OHM,5%,0.25W	80009	315-0303-00
A60R77	315-0474-00		RES,FXD,FILM:470K OHM,5%,0.25W	80009	315-0474-00
A60R83	315-0104-00		RES,FXD,FILM:100K OHM,5%,0.25W	80009	315-0104-00
A60R84	315-0102-00		RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A60R85	315-0103-00		RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A60R86	315-0241-00		RES,FXD,FILM:240 OHM,5%,0.25W	80009	315-0241-00
A60R87	315-0104-00		RES,FXD,FILM:100K OHM,5%,0.25W	80009	315-0104-00
A60R88	315-0331-00		RES,FXD,FILM:330 OHM,5%,0.25W	80009	315-0331-00
A60R89	315-0331-00		RES,FXD,FILM:330 OHM,5%,0.25W	80009	315-0331-00
A60S1	263-0011-09		SWITCH PB ASSY:1 PUSH,10MM,3 CONTACTS	80009	263-0011-09
A60S3	263-0011-09		SWITCH PB ASSY:1 PUSH,10MM,3 CONTACTS	80009	263-0011-09
A60S6	263-0023-02		SWITCH PB ASSY:3 LCH,7.5MM,6 CONTACTS	80009	263-0023-02
A60U12	156-0200-02		MICROCKT,LINEAR:OPNL AMPL	80009	156-0200-02
A60U17	156-0158-04		MICROCKT,LINEAR:DUAL OPNL AMPL	TK0961	UPC251D
A60U18	156-0356-01		MICROCKT,LINEAR:OPNL AMPL,CHECKED	02735	CA3080TX

Component No.	Tektronix Part No.	Serial/Assembly No. Effective Discont		Name & Description	Mfr. Code	Mfr. Part No.
A60U24	155-0144-00			MICROCKT, LINEAR: SYN STRIPPER	80009	155-0144-00
A60U31	156-0382-02			IC, DIGITAL: LSTTL, GATES; DUPLICATE OF 156-038	80009	156-0382-02
				2-00; 74LS00, DIP14.3, TUBE		
A60U33	156-0385-02			IC, DIGITAL: LSTTL, GATES; DUPLICATE OF 156-038	80009	156-0385-02
				5-00; 74LS04, DIP14.3, TUBE		
A60U34	156-0727-01			IC, DIGITAL: LSTTL, COUNTER; DUPLICATE OF 156-0	80009	156-0727-01
				727-00; 74LS196, DIP14.3, TUBE		
A60U41	156-0081-02			IC, DIGITAL: TTL, MULTIVIBRATOR; MONOSTABLE; 960	18324	8T22(NB OR FB)
				1, DIP14.3, SCRN		
A60U43	156-0388-03			IC, DIGITAL: LSTTL, FLIP FLOP; DUPLICATE OF 156	80009	156-0388-03
				-0388-00; 74LS74, DIP14.3, TUBE		
A60U45	156-0158-04	670-5022-01	670-5022-01	MICROCKT, LINEAR: DUAL OPNL AMPL	TK0961	UPC251D
A60U45	156-1272-00	670-5022-03	670-5022-03	IC, LINEAR: BIPOLAR, OP-AMP; DUAL, HIGH OUTPUT D	80009	156-1272-00
				RIVE, LOW NOISE; NE5532N, DIP08.3		
A60U45	156-0158-07	670-5022-05		IC, LINEAR: BIPOLAR, OP-AMP; DUPLICATE OF 156-0	80009	156-0158-07
				158-00, DO NOT USE; MC1458P1, DIP08.3		
A60U48	156-0570-00			MICROCKT, LINEAR: DUAL COMPARATOR	TK1468	LM319H
A60U53	156-0388-03			IC, DIGITAL: LSTTL, FLIP FLOP; DUPLICATE OF 156	80009	156-0388-03
				-0388-00; 74LS74, DIP14.3, TUBE		
A60U61	156-0561-00			MICROCKT, DCTL: TTL, 4-BIT BINARY COUNTER	01295	SN7493J
A60U62	156-0733-02			IC, DIGITAL: LSTTL, MULTIVIBRATOR; DUPLICATE OF	80009	156-0733-02
				156-0733-00; 74LS221, DIP16.3, TUBE		
A60U64	156-0721-02			IC, DIGITAL: LSTTL, GATES; DUPLICATE OF 156-072	80009	156-0721-02
				1-00; 74LS132, DIP14.3, TUBE		
A60U65	156-0651-02			IC, DIGITAL: LSTTL, SHIFT REGISTER; DUPLICATE O	80009	156-0651-02
				F 156-0651-00; 74LS164, DIP14.3, TUBE		
A60U66	156-0388-03			IC, DIGITAL: LSTTL, FLIP FLOP; DUPLICATE OF 156	80009	156-0388-03
				-0388-00; 74LS74, DIP14.3, TUBE		
A60U71	156-0479-02			IC, DIGITAL: LSTTL, GATE; DUPLICATE OF 156-0479	80009	156-0479-02
				-00, DO NOT USE; 74LS32, DIP14.3, TUBE		
A60U73	156-0479-02			IC, DIGITAL: LSTTL, GATE; DUPLICATE OF 156-0479	80009	156-0479-02
				-00, DO NOT USE; 74LS32, DIP14.3, TUBE		
A60U74	156-0905-11	B020000	B020955	MICROCKT, DCTL: 256 X 4 PROM, PROGRAMMED	80009	156-0905-11
A60U74	160-7319-00	B020956		MICROCKT, DCTL: STTL, 256 X 4 PROM, 3 STATE, 82S	80009	160-7319-00
				129A, 16 DIP		
A60U76	156-0422-02			IC, DIGITAL: LSTTL, COUNTER; DUPLICATE OF 156-0	80009	156-0422-02
				422-00; 74LS191, DIP16.3, TUBE		
A60U78	156-0058-02			IC, DIGITAL: TTL, GATES; DUPLICATE OF 156-0058-	80009	156-0058-02
				00; 7404, DIP14.3, TUBE		
A60U79	156-0030-03			IC, DIGITAL: TTL, GATES; DUPLICATE OF 156-0030-	80009	156-0030-03
				00; 7400, DIP14.3, TUBE		
A60U81	156-0381-02			IC, DIGITAL: LSTTL, GATES; DUPLICATE OF 156-038	80009	156-0381-02
				1-00; 74LS86, DIP14.3, TUBE		
A60U83	156-0381-02			IC, DIGITAL: LSTTL, GATES; DUPLICATE OF 156-038	80009	156-0381-02
				1-00; 74LS86, DIP14.3, TUBE		
A60U84	156-0480-02			IC, DIGITAL: LSTTL, GATES; DUPLICATE OF 156-048	80009	156-0480-02
				0-00; 74LS08, DIP14.3, TUBE		
A60U86	156-0422-02			IC, DIGITAL: LSTTL, COUNTER; DUPLICATE OF 156-0	80009	156-0422-02
				422-00; 74LS191, DIP16.3, TUBE		
A60U91	156-0480-02			IC, DIGITAL: LSTTL, GATES; DUPLICATE OF 156-048	80009	156-0480-02
				0-00; 74LS08, DIP14.3, TUBE		
A60U93	156-0480-02			IC, DIGITAL: LSTTL, GATES; DUPLICATE OF 156-048	80009	156-0480-02
				0-00; 74LS08, DIP14.3, TUBE		
A60U94	156-0905-12	B020000	B020955	MICROCKT, DCTL: 256 X 4 PROM, PROGRAMMED	80009	156-0905-12
A60U94	160-7320-00	B020956		MICROCKT, DCTL: STTL, 256 X 4 PROM, 3 STATE, 82S	80009	160-7320-00
				129A, 16 DIP		
A61	670-5023-01			CIRCUIT BD ASSY: READOUT DRIVER	80009	670-5023-01
A61C39	283-0111-00			CAP, FXD, CER DI: 0.1UF, 20%, 50V	80009	283-0111-00
A61C64	283-0067-00			CAP, FXD, CER DI: 0.001UF, 10%, 200V	51406	

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Discnt	Name & Description	Mfr. Code	Mfr. Part No.
A61C72	283-0032-00		CAP,FXD,CER DI:470PF,5%,500V	80009	283-0032-00
A61C84	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A61C91	283-0339-00		CAP,FXD,CER DI:0.22UF,10%,50V	04222	SR305C224KAA
A61C92	283-0594-00		CAP,FXD,MICA DI:0.001UF,1%,100V	80009	283-0594-00
A61C93	283-0601-00		CAP,FXD,MICA DI:22PF,10%,300V	80009	283-0601-00
A61C94	281-0204-00		CAP,VAR,PLASTIC:2-22PF,100V	19701	2807C00222MJ02
A61C95	283-0111-00		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A61C96	290-0782-00		CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A61C97	283-0330-00		CAP,FXD,CER DI:100PF,5%,50V	05397	C320C101J5R5CA
A61C99	290-0782-00		CAP,FXD,ELCTLT:4.7UF,+75-20%,35VDC	55680	UVX1V4R7MAA
A61CR82	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,D0-35,T&R	80009	152-0141-02
A61CR91	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,D0-35,T&R	80009	152-0141-02
A61CR92	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,D0-35,T&R	80009	152-0141-02
A61CR96	152-0141-02		DIODE,SIG:,ULTRA FAST;40V,150MA,4NS,2PF;1N4 152,D0-35,T&R	80009	152-0141-02
A61Q50	151-0301-00		TRANSISTOR,SIG:BIPOLAR,PNP;60V,600MA,200MHZ ,AMPLIFIER;2N2907A,TO-18	80009	151-0301-00
A61Q73	151-0302-00		TRANSISTOR,SIG:BIPOLAR,NPN;40V,800MA,300MHZ ,AMPLIFIER;2N222A,TO-18	80009	151-0302-00
A61Q83	151-0127-00		TRANSISTOR,SIG:BIPOLAR,NPN;15V,200MA,SWITCH ING;2N2369,TO-18	80009	151-0127-00
A61Q92	151-0127-00		TRANSISTOR,SIG:BIPOLAR,NPN;15V,200MA,SWITCH ING;2N2369,TO-18	80009	151-0127-00
A61Q95	151-0301-00		TRANSISTOR,SIG:BIPOLAR,PNP;60V,600MA,200MHZ ,AMPLIFIER;2N2907A,TO-18	80009	151-0301-00
A61Q96	151-0261-00		TRANSISTOR,SIG:BIPOLAR,PNP;60V,50MA,100MHZ, AMPLIFIER,TWO DIE DUAL;2N3810,TO-77	80009	151-0261-00
A61R10	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R11	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R12	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R13	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R14	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R15	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R16	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R17	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R18	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R19	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R20	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R21	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R22	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R23	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R24	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R25	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R26	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R27	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R28	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R29	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R30	315-0103-00		RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A61R31	315-0103-00		RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A61R35	315-0103-00		RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A61R36	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R37	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R38	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R39	315-0301-00		RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R50	315-0103-00		RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A61R51	315-0103-00		RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00

Component No.	Tektronix		Serial/Assembly No.		Name & Description	Mfr.	
	Part No.		Effective	Discont		Code	Mfr. Part No.
A61R52	315-0103-00				RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A61R53	315-0103-00				RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A61R54	315-0103-00				RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A61R55	315-0103-00				RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A61R56	315-0103-00				RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A61R57	315-0103-00				RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A61R58	315-0103-00				RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A61R59	315-0103-00				RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A61R60	315-0152-00				RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A61R61	315-0152-00				RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A61R62	315-0301-00				RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R64	315-0301-00				RES,FXD,FILM:300 OHM,5%,0.25W	80009	315-0301-00
A61R68	315-0103-00				RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A61R69	315-0103-00				RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A61R72	315-0103-00				RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A61R73	315-0472-00				RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A61R74	315-0472-00				RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A61R81	315-0304-00				RES,FXD,FILM:300K OHM,5%,0.25W	80009	315-0304-00
A61R82	315-0155-00				RES,FXD,FILM:1.5M OHM,5%,0.25W	80009	315-0155-00
A61R83	315-0472-00				RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A61R84	315-0472-00				RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A61R91	315-0472-00				RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A61R95	315-0472-00				RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A61R96	315-0472-00				RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A61R97	315-0103-00				RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A61S56	260-1589-00				SWITCH,ROCKER:(6)SPST,125MA,30VDC	81073	76SB06S
A61S57	260-1589-00				SWITCH,ROCKER:(6)SPST,125MA,30VDC	81073	76SB06S
A61U32	156-0128-01				IC,DIGITAL:TTL,DEMUX/DECODER;BCD-TO-7 SEGME NT, DRIVER;7447,DIP16.3,TUBE	01295	SN7447A N3 OR J4
A61U35	156-0128-01				IC,DIGITAL:TTL,DEMUX/DECODER;BCD-TO-7 SEGME NT, DRIVER;7447,DIP16.3,TUBE	01295	SN7447A N3 OR J4
A61U38	156-0128-01				IC,DIGITAL:TTL,DEMUX/DECODER;BCD-TO-7 SEGME NT, DRIVER;7447,DIP16.3,TUBE	01295	SN7447A N3 OR J4
A61U41	156-0087-00				IC,DIGITAL:TTL,ARITH FUNC;4-BIT BINARY FULL ADDER;7483,DIP16.3,TUBE	01295	SN7483A N OR J
A61U43	156-0569-00				IC,DIGITAL:LSTTL,COUNTER;SYNCH 4-BIT UP/DOW N DECADE;74LS190,DIP16.3,TUBE	27014	DM74LS190N
A61U46	156-0569-00				IC,DIGITAL:LSTTL,COUNTER;SYNCH 4-BIT UP/DOW N DECADE;74LS190,DIP16.3,TUBE	27014	DM74LS190N
A61U48	156-0569-00				IC,DIGITAL:LSTTL,COUNTER;SYNCH 4-BIT UP/DOW N DECADE;74LS190,DIP16.3,TUBE	27014	DM74LS190N
A61U60	156-0382-02				IC,DIGITAL:LSTTL,GATES;DUPLICATE OF 156-038 2-00;74LS00,DIP14.3,TUBE	80009	156-0382-02
A61U63	156-0388-03				IC,DIGITAL:LSTTL,FLIP FLOP;DUPLICATE OF 156 -0388-00;74LS74,DIP14.3,TUBE	80009	156-0388-03
A61U65	156-0386-02				IC,DIGITAL:LSTTL,GATES;DUPLICATE OF 156-038 6-00;74LS10,DIP14.3,TUBE	80009	156-0386-02
A61U68	156-0480-02				IC,DIGITAL:LSTTL,GATES;DUPLICATE OF 156-048 0-00;74LS08,DIP14.3,TUBE	80009	156-0480-02
A61U81	156-0656-02				IC,DIGITAL:LSTTL,COUNTER;DECADE;74LS90,DIP1 4.3,TUBE,SCRN	80009	156-0656-02
A61U85	156-0382-02				IC,DIGITAL:LSTTL,GATES;DUPLICATE OF 156-038 2-00;74LS00,DIP14.3,TUBE	80009	156-0382-02
A61U88	156-0422-02				IC,DIGITAL:LSTTL,COUNTER;DUPLICATE OF 156-0 422-00;74LS191,DIP16.3,TUBE	80009	156-0422-02
A61U91	156-0402-01				IC,MISC:BIPOLAR,TIMER;DUPLICATE OF 156-0402 -00,DO NOT USE;LM555CN,DIP08.3	27014	LM555CN/A+
A61U94	156-0096-00				IC,LINEAR:BIPOLAR,COMPARATOR;OPEN COLLECTOR ,200NS;LM311H,TO-99	04713	LM311H

## REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A61U98	156-0422-02			IC,DIGITAL:LSTTL,COUNTER;DUPLICATE OF 156-0422-00;74LS191,DIP16.3,TUBE	80009	156-0422-02
A62	670-5024-00			CIRCUIT BD ASSY:READOUT	80009	670-5024-00
A62DS24	150-1038-00			DIODE,OPTO:,LED;ORN,630NM,5 SEG;MAN3630A	58361	Q3410/MAN3630A
A62DS34	150-1037-00			LAMP,LED RDOUT:ORANGE,7 SEG,LH DECIMAL	58361	Q3409/MAN3620A
A62DS44	150-1037-00			LAMP,LED RDOUT:ORANGE,7 SEG,LH DECIMAL	58361	Q3409/MAN3620A
A62DS64	150-1037-00			LAMP,LED RDOUT:ORANGE,7 SEG,LH DECIMAL	58361	Q3409/MAN3620A
A62DS73	150-1000-00			LT EMITTING DIO:RED,650NM,40MA MAX	50579	RL-50
A62DS75	150-1000-00			LT EMITTING DIO:RED,650NM,40MA MAX	50579	RL-50
A70	670-4987-02	B020000	B020429	CIRCUIT BD ASSY:POWER SUPPLY	80009	670-4987-02
A70	670-4987-03	B020430	B021048	CIRCUIT BD ASSY:POWER SUPPLY	80009	670-4987-03
A70	670-4987-04	B021049		CIRCUIT BD ASSY:POWER SUPPLY	80009	670-4987-04
A70C1	290-0770-00			CAP,FXD,ELCTLT:100UF,+50-20%,25VDC	54473	ECE-A25V100L
A70C4	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A70C12	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A70C13	283-0060-00			CAP,FXD,CER DI:100PF,5%,200V	80009	283-0060-00
A70C14	283-0067-00			CAP,FXD,CER DI:0.001UF,10%,200V	51406	
A70C21	290-0517-00			CAP,FXD,ELCTLT:6.8UF,20%,35V	05397	T368B685M035AZ
A70C31	290-0770-00			CAP,FXD,ELCTLT:100UF,+50-20%,25VDC	54473	ECE-A25V100L
A70C33	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A70C37	290-0436-00			CAP,FXD,ELCTLT:10000UF,+100-10%,10V	24165	68D10467
A70C42	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A70C44	283-0060-00			CAP,FXD,CER DI:100PF,5%,200V	80009	283-0060-00
A70C51	290-0517-00			CAP,FXD,ELCTLT:6.8UF,20%,35V	05397	T368B685M035AZ
A70C54	283-0067-00			CAP,FXD,CER DI:0.001UF,10%,200V	51406	
A70C57	290-0506-00	670-4987-02	670-4987-03	CAP,FXD,ELCTLT:9600UF,+100-10%,30V	24165	68D10471
A70C57	290-0506-04	670-4987-04		CAP,FXD,AL:9600UF,-10/+50%,30V,1.37 X 1.97; SPECIAL FOR PFP SERIESREPL,NOT FOR NEW DESI GN	80009	290-0506-04
A70C62	290-0517-00			CAP,FXD,ELCTLT:6.8UF,20%,35V	05397	T368B685M035AZ
A70C71	290-0517-00			CAP,FXD,ELCTLT:6.8UF,20%,35V	05397	T368B685M035AZ
A70C84	283-0067-00			CAP,FXD,CER DI:0.001UF,10%,200V	51406	
A70C85	283-0060-00			CAP,FXD,CER DI:100PF,5%,200V	80009	283-0060-00
A70C87	290-0506-00	670-4987-02	670-4987-03	CAP,FXD,ELCTLT:9600UF,+100-10%,30V	24165	68D10471
A70C87	290-0506-04	670-4987-04		CAP,FXD,AL:9600UF,-10/+50%,30V,1.37 X 1.97; SPECIAL FOR PFP SERIESREPL,NOT FOR NEW DESI GN	80009	290-0506-04
A70C91	290-0770-00			CAP,FXD,ELCTLT:100UF,+50-20%,25VDC	54473	ECE-A25V100L
A70C92	283-0003-00			CAP,FXD,CER DI:0.01UF,+80-20%,150V	80009	283-0003-00
A70C93	283-0177-00			CAP,FXD,CER DI:1UF,+80-20%,25V	04222	SR305E105ZAA
A70CR20	152-0066-00			DIODE,RECT:.,400V,1A,IFSM = 30A;GP10G,DO-41 ,T&R,SAFETY CONTROLLED	05828	GP10G-020
A70CR21	283-0111-00	B020430		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A70CR25	152-0661-00			DIODE,RECT:.,FAST RCVRY:600V,3A,200NS;TR	80009	152-0661-00
A70CR30	283-0111-00	B020430		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A70CR31	152-0066-00			DIODE,RECT:.,400V,1A,IFSM = 30A;GP10G,DO-41 ,T&R,SAFETY CONTROLLED	05828	GP10G-020
A70CR35	152-0661-00			DIODE,RECT:.,FAST RCVRY:600V,3A,200NS;TR	80009	152-0661-00
A70CR36	152-0661-00			DIODE,RECT:.,FAST RCVRY:600V,3A,200NS;TR	80009	152-0661-00
A70CR45	152-0661-00			DIODE,RECT:.,FAST RCVRY:600V,3A,200NS;TR	80009	152-0661-00
A70CR55	152-0784-00			SEMICON DVC,DI:RECT,SI,200V,5A,200NS,MR821	80009	152-0784-00
A70CR65	152-0784-00			SEMICON DVC,DI:RECT,SI,200V,5A,200NS,MR821	80009	152-0784-00
A70CR75	152-0784-00			SEMICON DVC,DI:RECT,SI,200V,5A,200NS,MR821	80009	152-0784-00
A70CR76	152-0784-00			SEMICON DVC,DI:RECT,SI,200V,5A,200NS,MR821	80009	152-0784-00
A70CR80	283-0111-00	B020430		CAP,FXD,CER DI:0.1UF,20%,50V	80009	283-0111-00
A70CR81	152-0066-00			DIODE,RECT:.,400V,1A,IFSM = 30A;GP10G,DO-41 ,T&R,SAFETY CONTROLLED	05828	GP10G-020
A70DS10	150-1001-00			LT EMITTING DIO:RED,660NM,100MA MAX	58361	MV5024
A70DS40	150-1001-00			LT EMITTING DIO:RED,660NM,100MA MAX	58361	MV5024



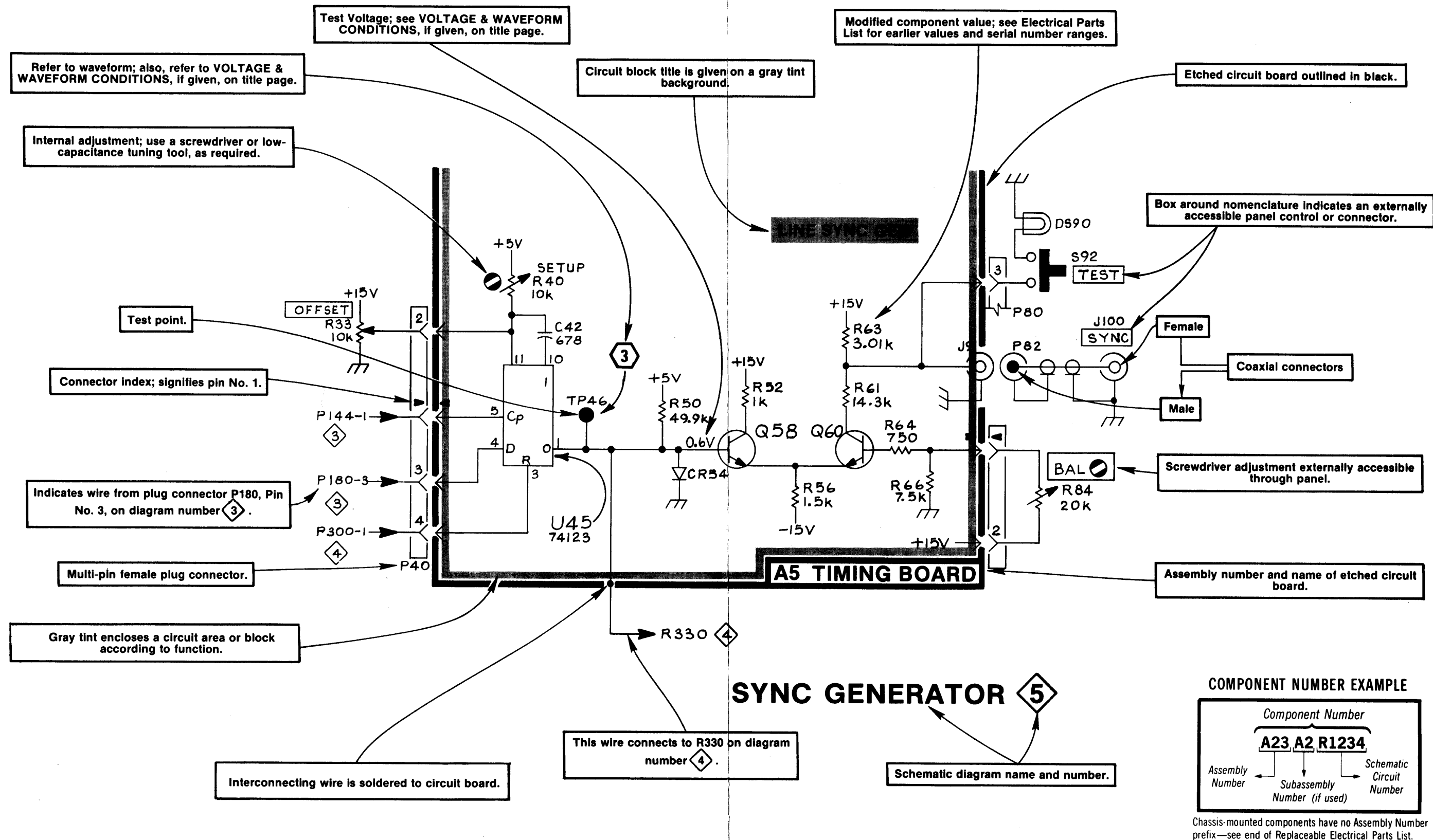
Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Dscont	Name & Description	Mfr. Code	Mfr. Part No.
A70DS70	150-1001-00		LT EMITTING DIO:RED,660NM,100MA MAX	58361	MV5024
A70F17	159-0014-00		FUSE,CARTRIDGE:3AG,5A,250V,0.8SEC	71400	MTH-CW-5
A70Q10	151-0192-00		TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A70Q13	151-0389-00		TRANSISTOR:PNP,SI,TO-39	80009	151-0389-00
A70Q14	151-0220-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A70Q22	151-0232-00		TRANSISTOR,SIG:BIPOLAR,NPN;45V,30MA,60MHZ,A MPLIFIER,TWO DIE DUAL;2N2918,TO-78	80009	151-0232-00
A70Q23	151-0190-00		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A70Q41	151-0192-00		TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A70Q43	151-0389-00		TRANSISTOR:PNP,SI,TO-39	80009	151-0389-00
A70Q52	151-0232-00		TRANSISTOR,SIG:BIPOLAR,NPN;45V,30MA,60MHZ,A MPLIFIER,TWO DIE DUAL;2N2918,TO-78	80009	151-0232-00
A70Q53	151-0220-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A70Q54	151-0190-00		TRANSISTOR,SIG:BIPOLAR,NPN;40V,200MA,300MHZ ,AMPLIFIER;2N3904,TO-92 EBC	80009	151-0190-00
A70Q72	151-0220-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A70Q73	151-0220-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A70Q81	151-0220-00		TRANSISTOR,SIG:BIPOLAR,PNP;40V,200MA,400MHZ ,AMPLIFIER;2N3906(SEL),TO-92 EBC	80009	151-0220-00
A70Q82	151-0192-00		TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
A70Q83	151-0207-00		TRANSISTOR:NPN,SI,TO-92	80009	151-0207-00
A70R2	308-0590-00		RES,FXD,WW:0.25 OHM,5%,3W	07088	
A70R6	315-0471-00		RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A70R10	315-0122-00		RES,FXD,FILM:1.2K OHM,5%,0.25W	80009	315-0122-00
A70R11	315-0103-00		RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A70R12	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A70R13	315-0680-00		RES,FXD,FILM:68 OHM,5%,0.25W	80009	315-0680-00
A70R14	315-0471-00		RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A70R15	315-0241-00		RES,FXD,FILM:240 OHM,5%,0.25W	80009	315-0241-00
A70R20	321-0779-03		RES,FXD,FILM:7.020K OHM,0.25%,0.125W,TC=T2	07716	CEAC70200C
A70R21	321-0779-03		RES,FXD,FILM:7.020K OHM,0.25%,0.125W,TC=T2	07716	CEAC70200C
A70R22	315-0153-00		RES,FXD,FILM:15K OHM,5%,0.25W	80009	315-0153-00
A70R23	315-0102-00		RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A70R24	315-0152-00		RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A70R25	315-0152-00		RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A70R32	315-0472-00		RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00
A70R33	315-0680-00		RES,FXD,FILM:68 OHM,5%,0.25W	80009	315-0680-00
A70R41	308-0590-00		RES,FXD,WW:0.25 OHM,5%,3W	07088	
A70R42	315-0101-00		RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A70R44	315-0241-00		RES,FXD,FILM:240 OHM,5%,0.25W	80009	315-0241-00
A70R45	315-0471-00		RES,FXD,FILM:470 OHM,5%,0.25W	80009	315-0471-00
A70R50	315-0331-00		RES,FXD,FILM:330 OHM,5%,0.25W	80009	315-0331-00
A70R51	321-0816-07		RES,FXD,FILM:5K OHM,0.1%,0.125W,TC=T9	80009	321-0816-07
A70R52	315-0103-00		RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A70R53	315-0102-00		RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A70R54	315-0684-00		RES,FXD,FILM:680K OHM,5%,0.25W	01121	CB6845
A70R55	315-0152-00		RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A70R56	315-0152-00		RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A70R60	321-0603-07		RES,FXD,FILM:15K OHM,0.1%,0.125W,TC=T9	80009	321-0603-07
A70R61	315-0153-00		RES,FXD,FILM:15K OHM,5%,0.25W	80009	315-0153-00
A70R62	315-0362-00		RES,FXD,FILM:3.6K OHM,5%,0.25W	80009	315-0362-00
A70R63	315-0363-00		RES,FXD,FILM:36K OHM,5%,0.25W	80009	315-0363-00
A70R64	315-0562-00		RES,FXD,FILM:5.6K OHM,5%,0.25W	80009	315-0562-00
A70R65	315-0472-00		RES,FXD,FILM:4.7K OHM,5%,0.25W	80009	315-0472-00

# REPLACEABLE ELECTRICAL PARTS - 1450-1

Component No.	Tektronix Part No.	Serial/Assembly No. Effective	Discont	Name & Description	Mfr. Code	Mfr. Part No.
A70R66	311-1241-00			RES,VAR,NONWW:TRMR,100K OHM,0.5W	80009	311-1241-00
A70R70	322-3200-00			RES,FXD,FILM:1.18K OHM,1%,0.2W,TC=T0	80009	322-3200-00
A70R71	321-0669-00			RES,FXD,FILM:6.08K OHM,0.5%,0.125W,TC=T2	07716	CEAC608000
A70R72	321-0283-08			RES,FXD,FILM:8.66K OHM,1%,0.125W,TC=T2	01121	ORDER BY DESCR
A70R73	315-0105-00			RES,FXD,FILM:1M OHM,5%,0.25W	80009	315-0105-00
A70R74	315-0152-00			RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A70R75	315-0152-00			RES,FXD,FILM:1.5K OHM,5%,0.25W	80009	315-0152-00
A70R80	315-0122-00			RES,FXD,FILM:1.2K OHM,5%,0.25W	80009	315-0122-00
A70R82	315-0102-00			RES,FXD,FILM:1K OHM,5%,0.25W	80009	315-0102-00
A70R83	315-0103-00			RES,FXD,FILM:10K OHM,5%,0.25W	80009	315-0103-00
A70R84	315-0101-00			RES,FXD,FILM:100 OHM,5%,0.25W	80009	315-0101-00
A70R85	315-0680-00			RES,FXD,FILM:68 OHM,5%,0.25W	80009	315-0680-00
A70R86	315-0241-00			RES,FXD,FILM:240 OHM,5%,0.25W	80009	315-0241-00
A70R91	308-0590-00			RES,FXD,WW:0.25 OHM,5%,3W	07088	
A70R93	301-0102-00			RES,FXD,CMPSN:1K OHM,5%,0.50W	01121	EB1025
A70R94	315-0202-00			RES,FXD,FILM:2K OHM,5%,0.25W	80009	315-0202-00
A70VR62	152-0317-00			DIODE,ZENER:;6.2V,5%,0.4W;1N825,DO-35,TR	04713	1N825
A70VR73	152-0127-00			DIODE,ZENER:;7.5V,5%,0.4W;1N958B,DO-35 OR 7,TR	80009	152-0127-00
A80	672-0638-01	B020000	B020429	CIRCUIT BD ASSY:PIN DRIVER/IF ATTN AMPL	80009	672-0638-01
A80	672-0638-03	B020430		CIRCUIT BD ASSY:PIN DRIVER	80009	672-0638-03
A82	672-0639-06			CIRCUIT BD ASSY:PIN DRVR/IF ATTN/MIXER/FIL TER (OPTION 03 ONLY)	80009	672-0639-06
A82	672-0639-07			CIRCUIT BD ASSY:PIN DRVR/IF ATTN/MIXER/FIL TER (OPTION 01 & 02)	80009	672-0639-07
C1	283-0672-00			CAP,FXD,MICA DI:200PF,1%,500V	80009	283-0672-00
C2	285-0862-00			CAP,FXD,PLASTIC:0.001,10%,100V	19396	DU490/74-28219
C3	285-0598-00			CAP,FXD,PLASTIC:0.01UF,5%,100V	19396	DU490B103J
C4	285-1101-00			CAP,FXD,PLASTIC:0.022UF,10%,200V	19396	223K02PT485
C5	283-0179-00			CAP,FXD,CER DI:0.68UF,10%,100V	80009	283-0179-00
C12	283-0065-00			CAP,FXD,CER DI:0.001UF,5%,50V	80009	283-0065-00
DS1	150-1017-00			LT EMITTING DIO:GREEN,550NM,55MA MAX	80009	150-1017-00
DS2	150-1077-00			LT EMITTING DIO:RED,650NM,40MA MAX	05464	LL201R
DS3	150-1077-00			LT EMITTING DIO:RED,650NM,40MA MAX	05464	LL201R
DS4	150-1077-00			LT EMITTING DIO:RED,650NM,40MA MAX	05464	LL201R
F10	159-0041-00			FUSE,CARTRIDGE:3AG,1.25A,250V,20SEC	71400	MSL 1 1/4
J1	131-1315-01			CONN,RF JACK:	80009	131-1315-01
J3	131-0267-00			JACK,TELEPHONE:3 CONDUCTOR,PANEL MOUNT	82389	12B
J4	131-0934-00			CONN,EDGE CARD:;	31781	307-024-500-302
J10	131-1315-01			CONN,RF JACK:	80009	131-1315-01
J11	131-1315-01			CONN,RF JACK:	80009	131-1315-01
J12	124-0342-00			TERMINAL BOARD:2 CONTACTS	80009	124-0342-00
J13	131-0014-00			CONN,RCPT,ELEC:MALE,3 CONTACT	82389	C3M
J14	131-1006-00			CONN,D-SUB:;SLDR CUP/PNL;FEMALE,STR,9 POS, 0.112 CTR,0.120 MTG HOLE,ACCOM 20 AWG;,,	00779	747905-5
J16	131-1315-01			CONN,RF JACK:	80009	131-1315-01
J17	131-1315-01			CONN,RF JACK:	80009	131-1315-01
J18	131-1315-01			CONN,RF JACK:	80009	131-1315-01
J19	131-1315-01			CONN,RF JACK:	80009	131-1315-01
J20	131-1315-01			CONN,RF JACK:	80009	131-1315-01
LR12	108-0931-00			COIL,RF:FIXED,400NH	80009	108-0931-00
P10	119-0813-00			SELECTOR,LINE V:W/LINE FLTR,RCPT & FUSE	02777	F65003
Q5	151-0373-00			TRANSISTOR:PNP,SI,TO-127	04713	SJE925
Q34	151-0373-00			TRANSISTOR:PNP,SI,TO-127	04713	SJE925
Q61	151-0352-00			TRANSISTOR:NPN,SI,TO-220	80009	151-0352-00
Q62	151-0366-00			TRANSISTOR:PNP,SI,TO-220	80009	151-0366-00

Component No.	Tektronix Part No.	Serial/Assembly No. Effective    Dscont	Name & Description	Mfr. Code	Mfr. Part No.
Q63	151-0366-00		TRANSISTOR:PNP,SI,TO-220	80009	151-0366-00
Q64	151-0352-00		TRANSISTOR:NPN,SI,TO-220	80009	151-0352-00
Q65	151-0405-00		TRANSISTOR:DARLINGTON,NPN,SI,TO-126	80009	151-0405-00
Q66	151-0192-00		TRANSISTOR:NPN,SI,TO-92	80009	151-0192-00
Q67	151-0429-00		TRANSISTOR:DARLINGTON,PNP,SI,TO-126	80009	151-0429-00
Q95	151-0349-00		TRANSISTOR,PWR:BIPOLAR,NPN;DISCONTINUED;MJE 2801,TO-127	04713	SJE924
R1	311-1483-00		RES,VAR,NONWW:PNL,100K OHM,0.5W	80009	311-1483-00
R2	311-1150-00		RES,VAR,WW:PNL,10K OHM,1W	80009	311-1150-00
R3	311-0555-00		RES,VAR,NONWW:PNL,10K OHM,1W	80009	311-0555-00
S1	260-1874-00		SWITCH,ROTARY:TIME CONSTANT	76854	5-15631-420
S2	260-1901-00		SWITCH,TOGGLE:DPST,8A,250V	15605	7320K55 29-761
T10	120-1145-00		XFMR,PWR,STPDN:	80009	120-1145-00
W2	175-2079-00		CABLE ASSY,RF:50 OHM COAX,16.0 L	80009	175-2079-00
W3	012-0751-00		CABLE,INTCON:7.375 L	80009	012-0751-00
W4	012-0752-00		CABLE,INTCON:7.5 L	80009	012-0752-00
W15	175-2078-00		CABLE ASSY,RF:50 OHM COAX,6.0 L	80009	175-2078-00





## SCHEMATIC EXAMPLE

# DIAGRAMS & CIRCUIT BOARD ILLUSTRATIONS

This section of the manual contains block and schematic diagrams with waveforms, and etched circuit board illustrations.

## Symbols

Symbols used on the diagrams are based on ANSI Y32.2-1970 and IEEE No. 315 March 1971. Logic symbology is based on ANSI Y32.14-1973 (IEEE Std. 91-1973). Logic symbols depict the logic function performed and may differ from the manufacturer's data.

## Component Values

Electrical components shown on the diagrams are in the following units unless noted otherwise:

Capacitors = Values one or greater are in picofarads (pF).  
Values less than one are in micofarads ( $\mu$ F).

Resistors = Ohms ( $\Omega$ ).

## Semiconductor Types

Refer to the Electrical Parts List.

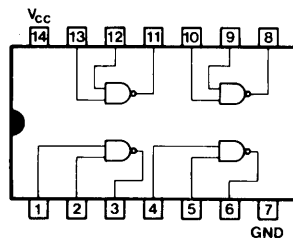
## Reference Designators

The following letters are used as reference designators to identify components or assemblies on Tektronix, Inc. schematic diagrams.

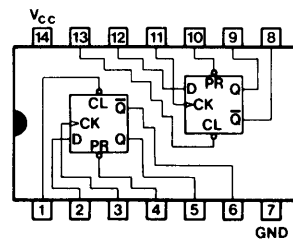
<b>A</b>	Assembly, separable or repairable (circuit board, etc.)	<b>LR</b>	Inductor/resistor combination
<b>AT</b>	Attenuator, fixed or variable	<b>M</b>	Meter
<b>B</b>	Motor	<b>P</b>	Connector, movable portion
<b>BT</b>	Battery	<b>Q</b>	Transistor, silicon-controlled rectifier, or programmable unijunction transistor
<b>C</b>	Capacitor, fixed or variable	<b>R</b>	Resistor, fixed or variable
<b>CR</b>	Diode, signal or rectifier	<b>RT</b>	Thermistors
<b>DH</b>	Decoupling Hybrid	<b>S</b>	Switch
<b>DL</b>	Delay Line	<b>T</b>	Transformer
<b>DS</b>	Indicating device (lamp)	<b>TC</b>	Thermocouple
<b>E</b>	Spark Gap	<b>TP</b>	Test Point
<b>F</b>	Fuse	<b>U</b>	Assembly, inseparable or non-repairable (integrated circuit, etc.)
<b>FL</b>	Filter	<b>V</b>	Electron tube
<b>H</b>	Heat dissipating device (heat sink, heat radiator, etc.)	<b>VR</b>	Voltage regulator (zener diode, etc.)
<b>HR</b>	Heater	<b>Y</b>	Crystal
<b>J</b>	Connector, stationary portion		
<b>K</b>	Relay		
<b>L</b>	Inductor, fixed or variable		

## Partial Schematic Diagram With Explanations

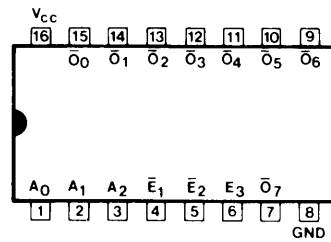
The partial diagram at the left is an example of the various symbols and other information provided on Tektronix, Inc. diagrams.



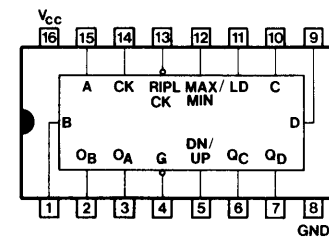
**7400, 74LS00**



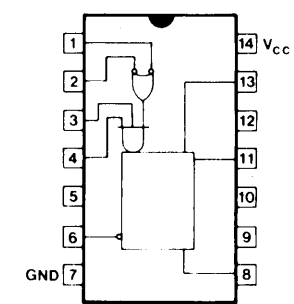
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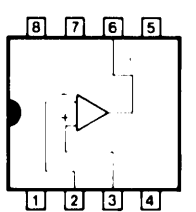
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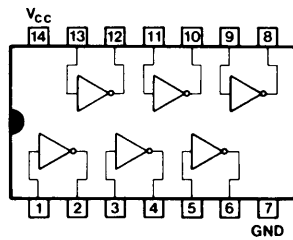
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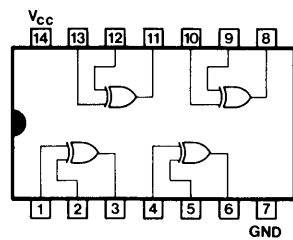
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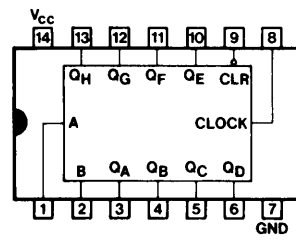
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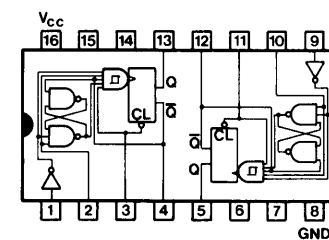
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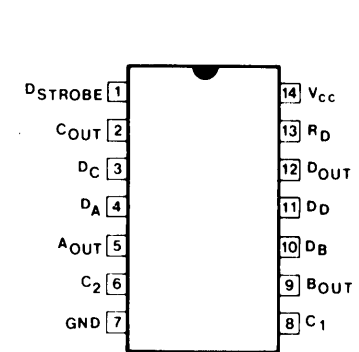
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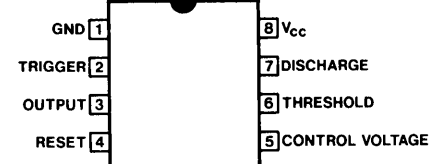
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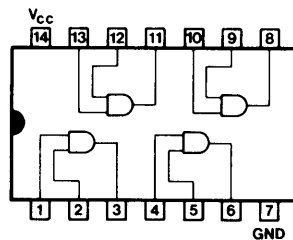
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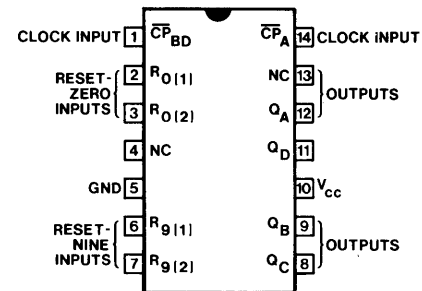
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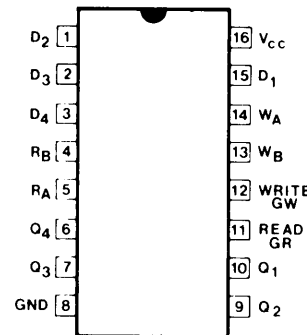
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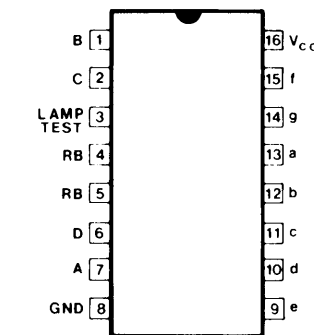
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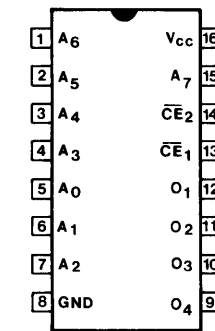
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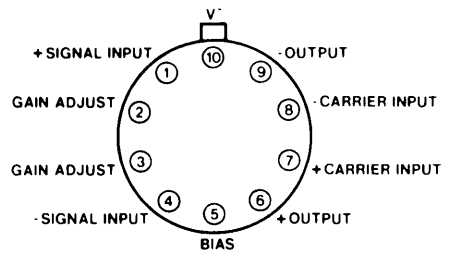
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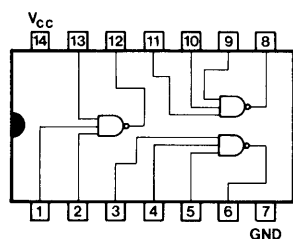
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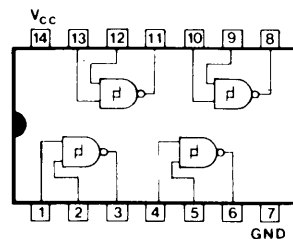
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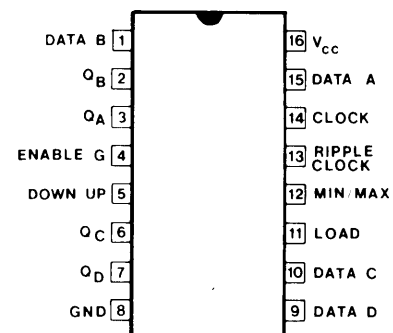
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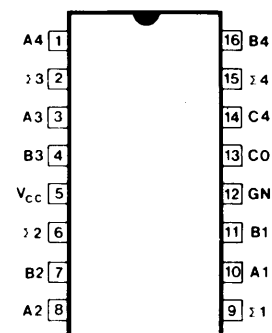
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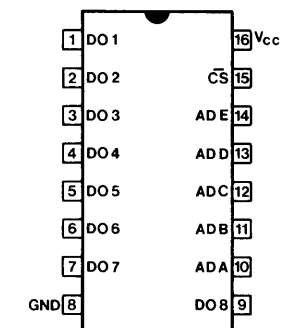
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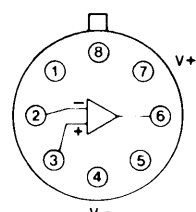
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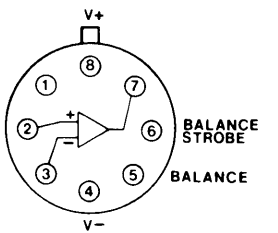
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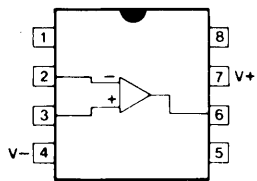


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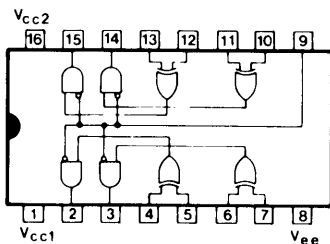


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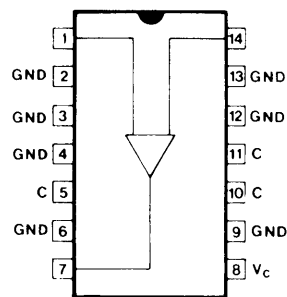
## IC LOGIC DIAGRAMS



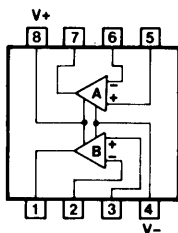
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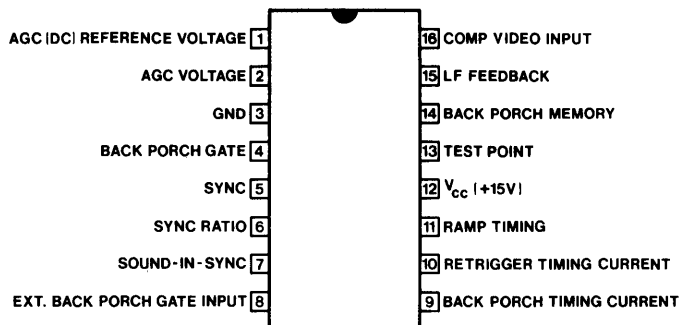
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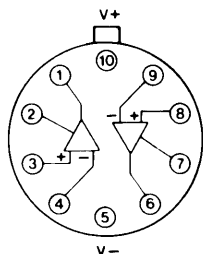
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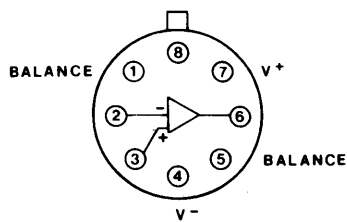
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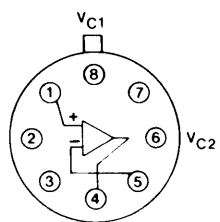
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319



356



3028

## WAVEFORM CONDITIONS

1450-1

SYNCHRONOUS DETECTION MODE  
SOUND TRAP  
INTERNAL ZERO CARRIER REF  
AUTO AGC  
AUDIO SOURCE  
DE-EMPHASIS

BACK PORCH  
IN  
ON  
BACK PORCH  
INTR  
IN

TEST MODULATOR

THE 1450-1 IF INPUT DRIVEN WITH A TEST MODULATOR  
THE TEST MODULATOR DRIVEN WITH:

1. LINEARITY RAMP (VIDEO)
2. 10 kHz (AUDIO)
3. NO PRE-EMPHASIS

Diagram waveforms & taken  
with pins 5 and 6 on A53 shorted together.



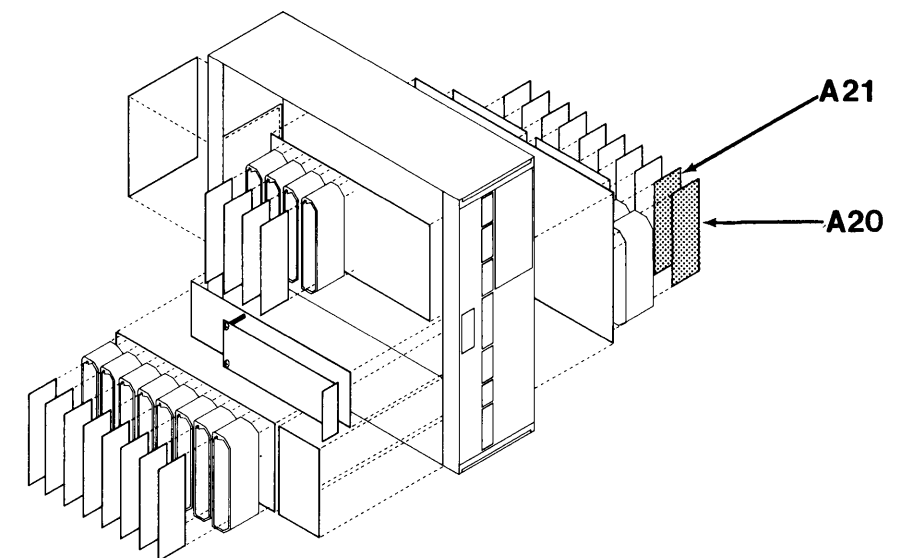
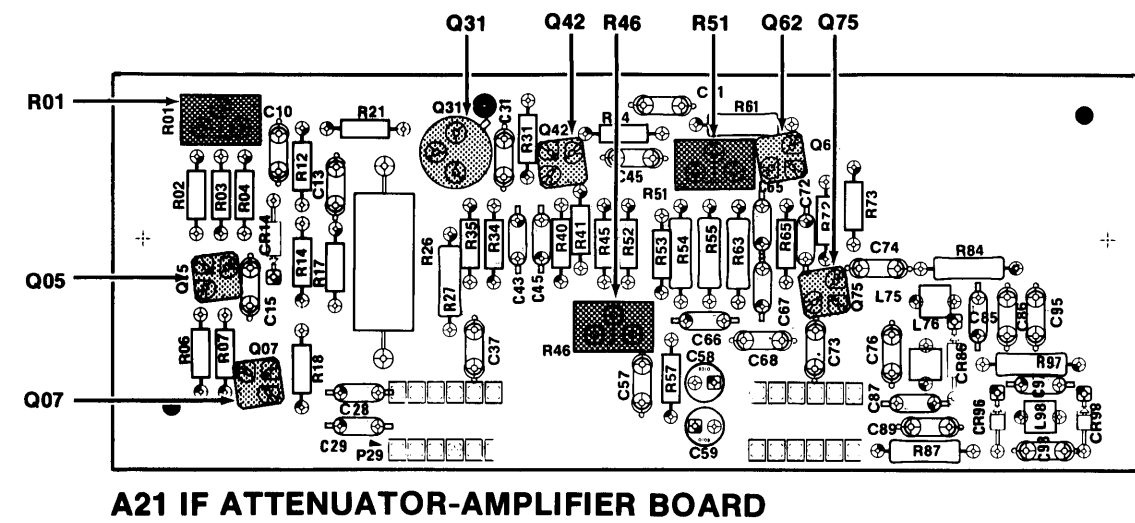
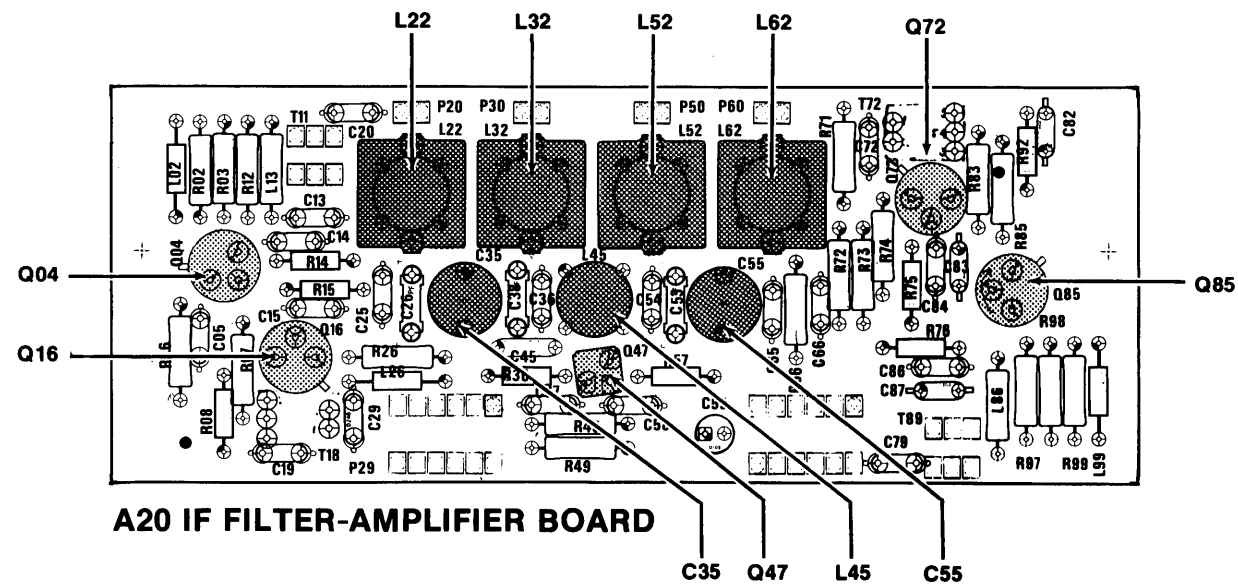
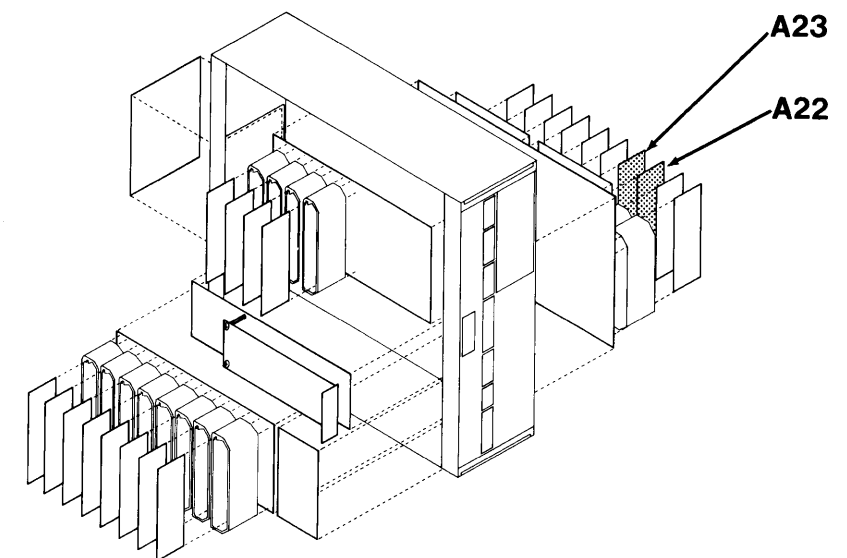
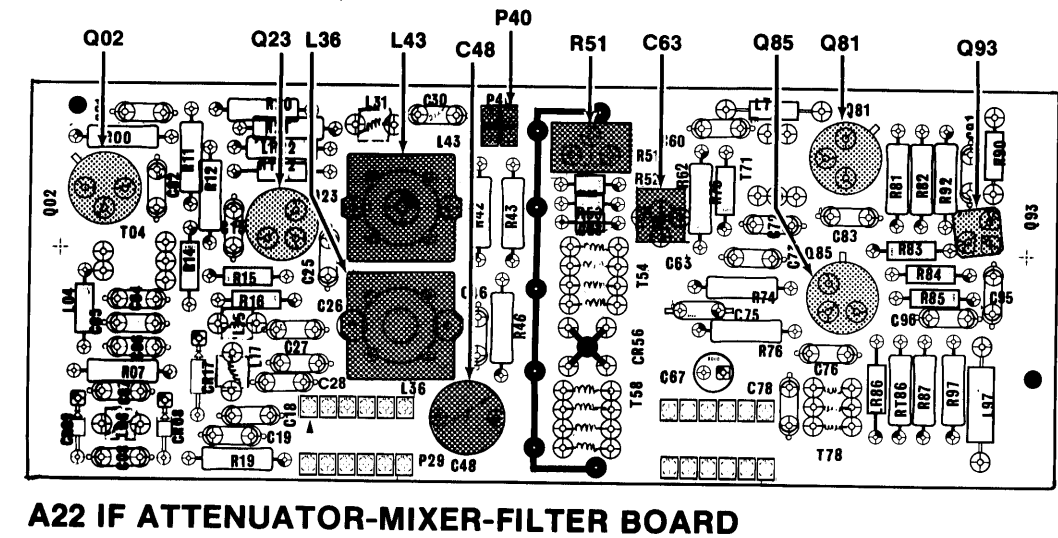
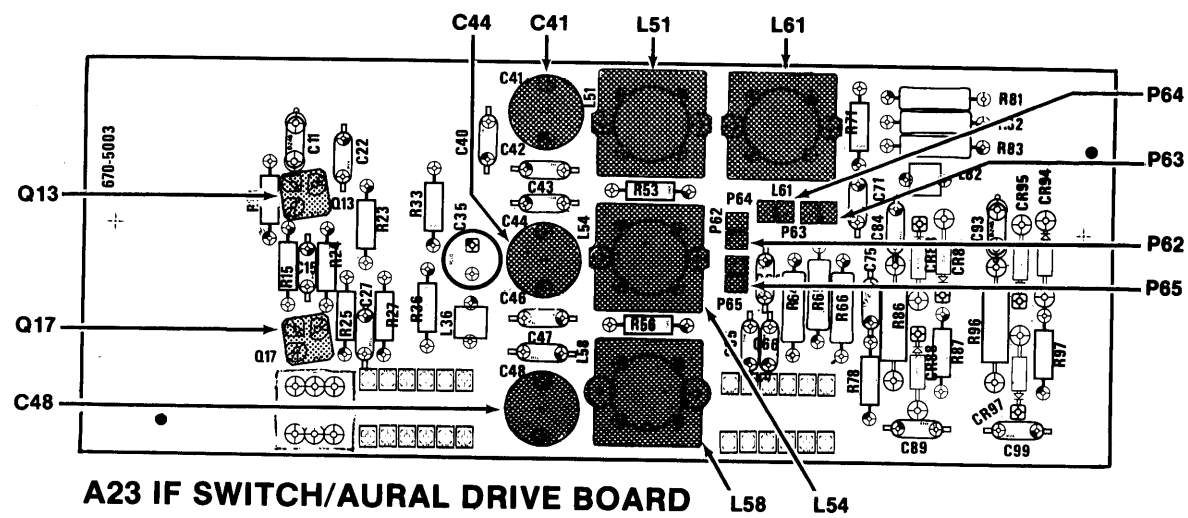
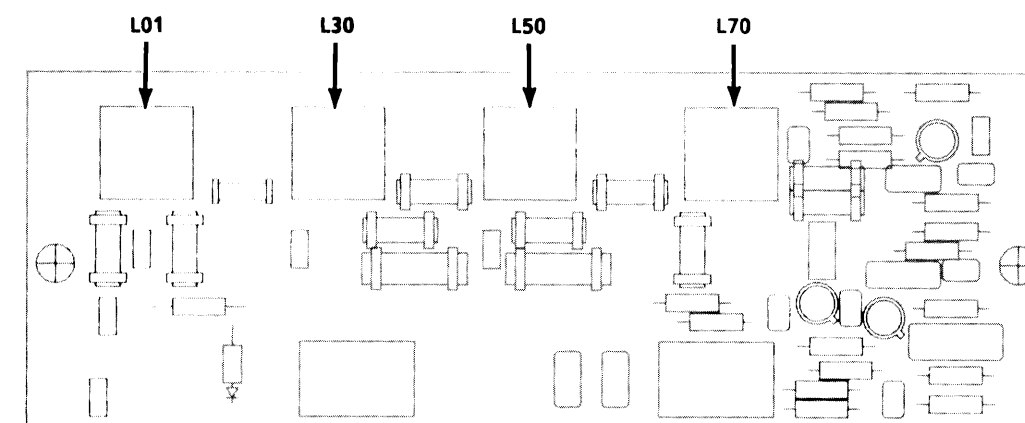
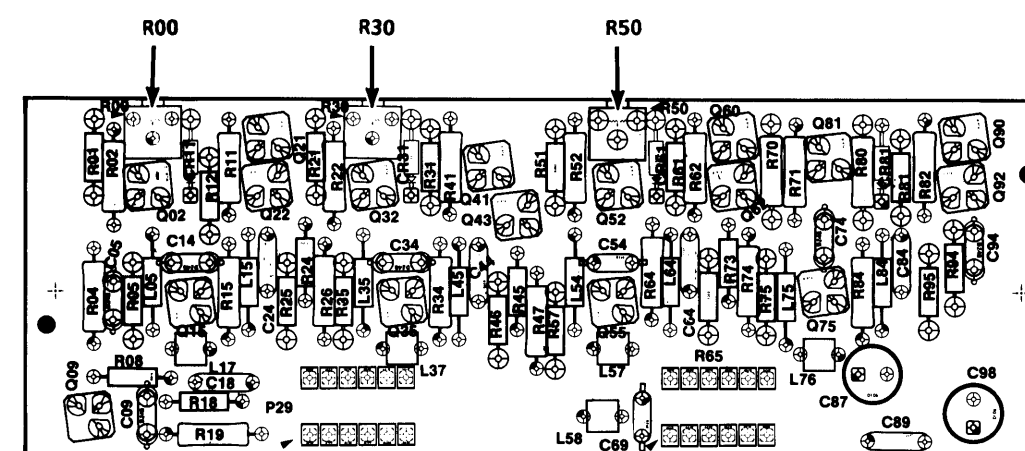


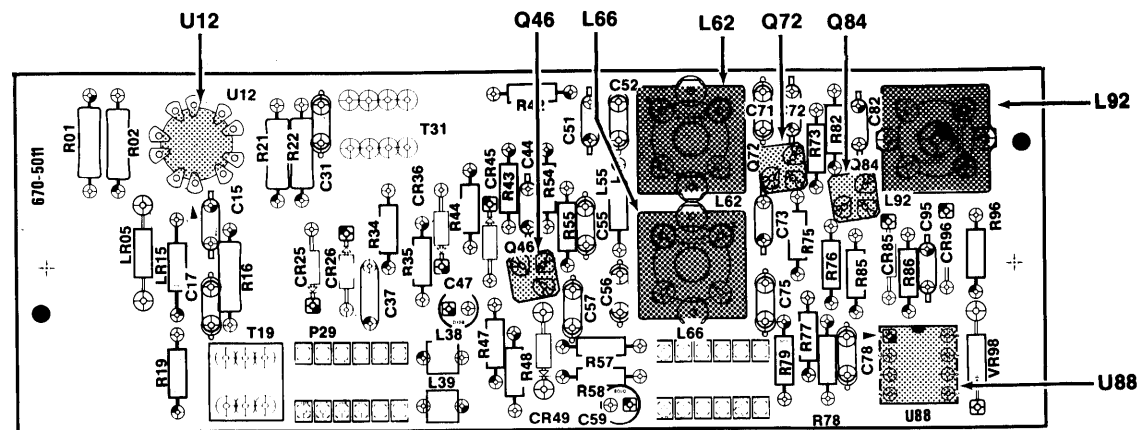
FIG. 8-1. CIRCUIT BOARD ADJUSTMENT LOCATIONS.



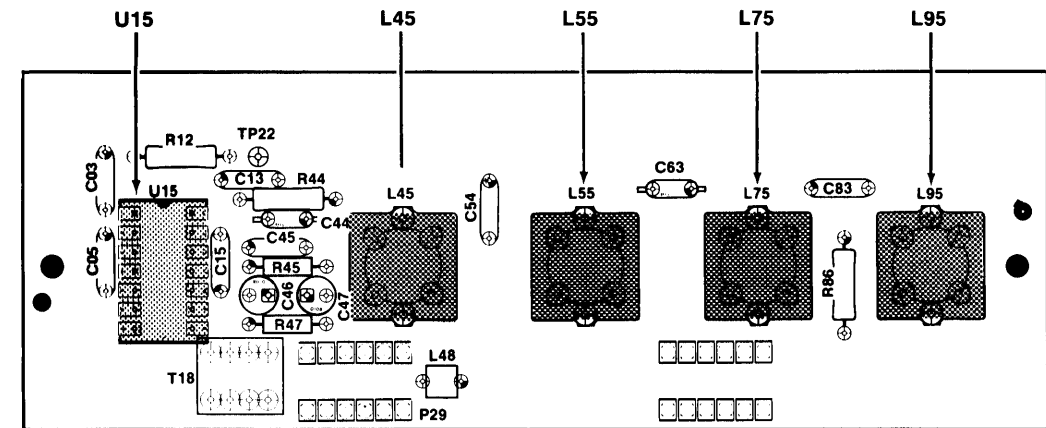
**Fig. 8-2. CIRCUIT BOARD ADJUSTMENTS AND JUMPER LOCATIONS.**



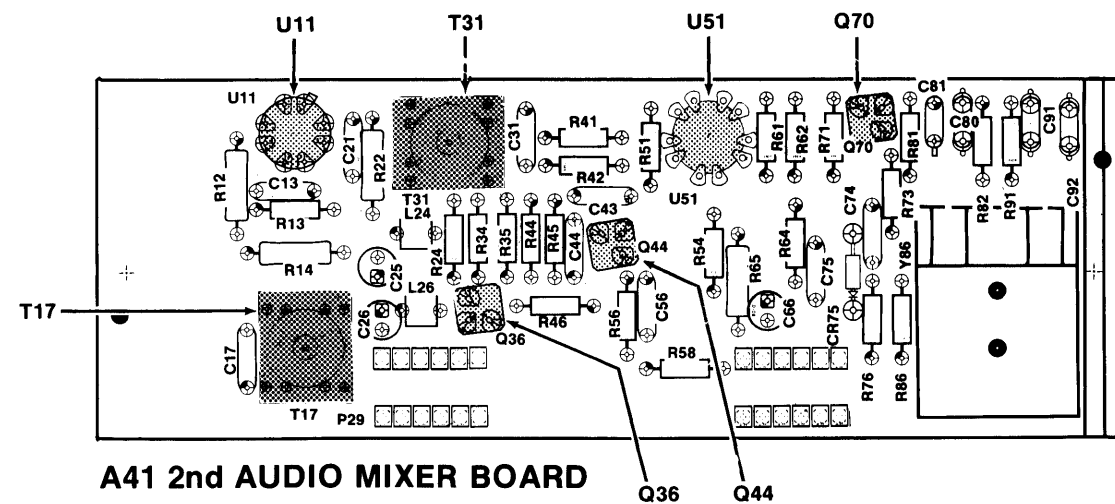
**A45 Q-P FILTER BOARD****A46 Q-P LIMITER BOARD****FIG. 8-4. CIRCUIT BOARD ADJUSTMENT AND JUMPER LOCATIONS.**



A40 1st AUDIO MIXER BOARD



A42 AUDIO LIMITER BOARD



A41 2nd AUDIO MIXER BOARD

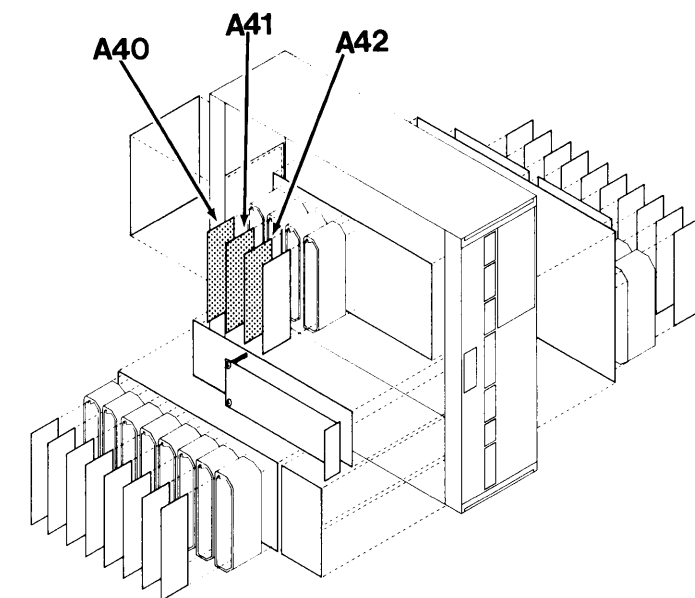
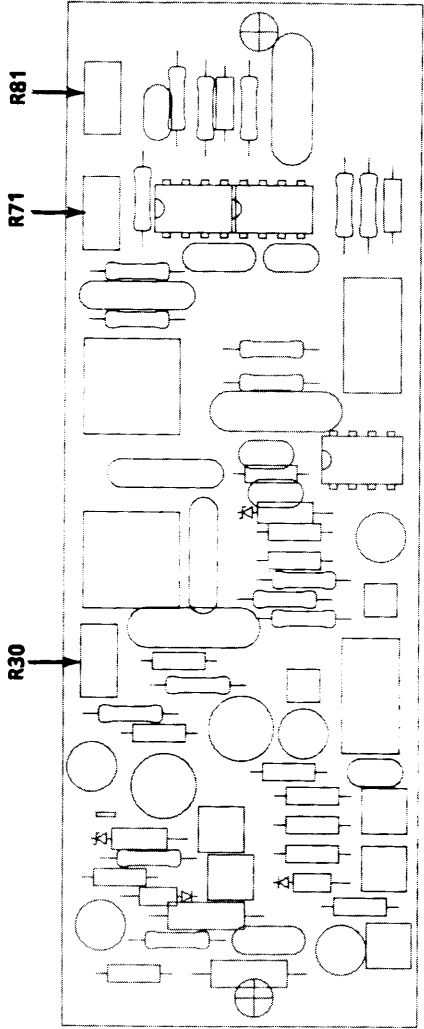
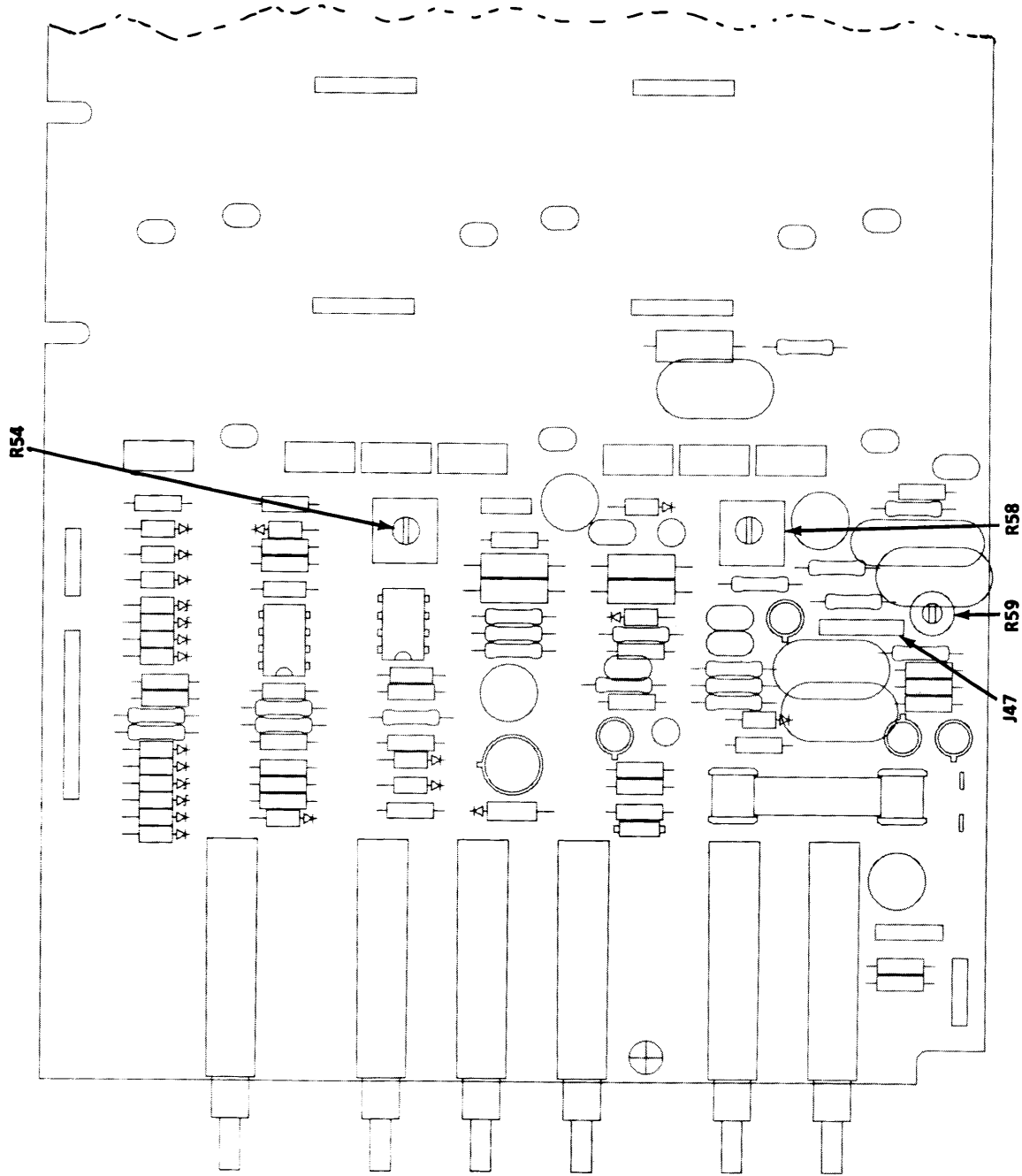


FIG. 8-5. CIRCUIT BOARD ADJUSTMENT LOCATIONS.

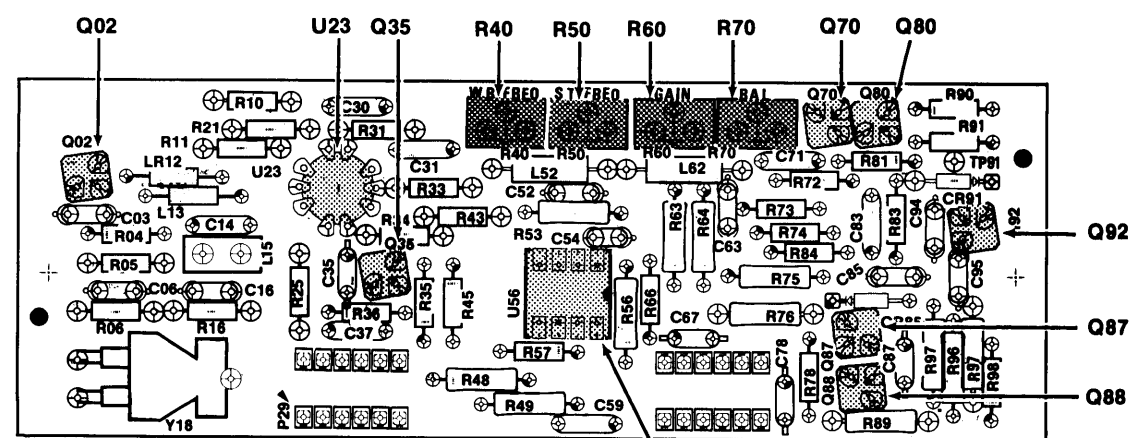


A43 AUDIO DISCRIMINATOR BOARD

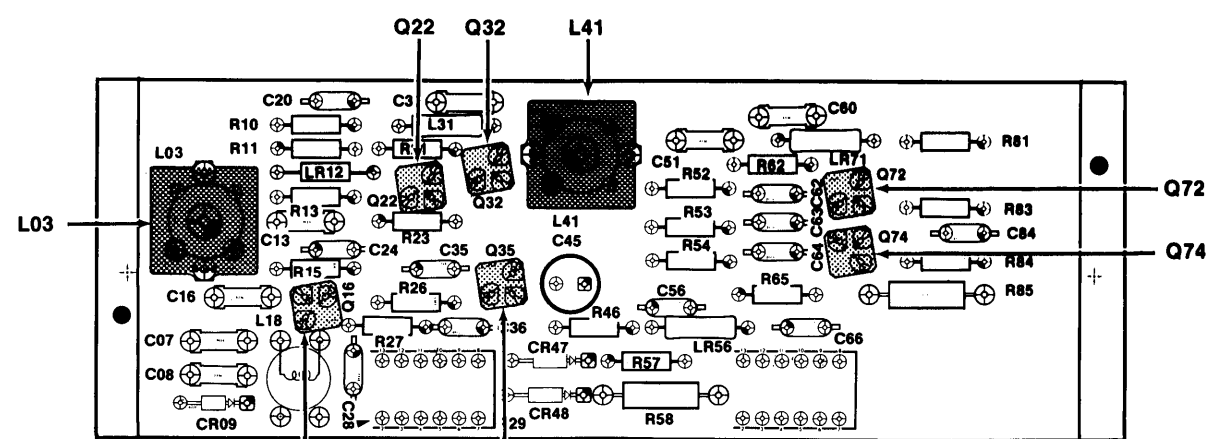


A44 AUDIO INTERFACE

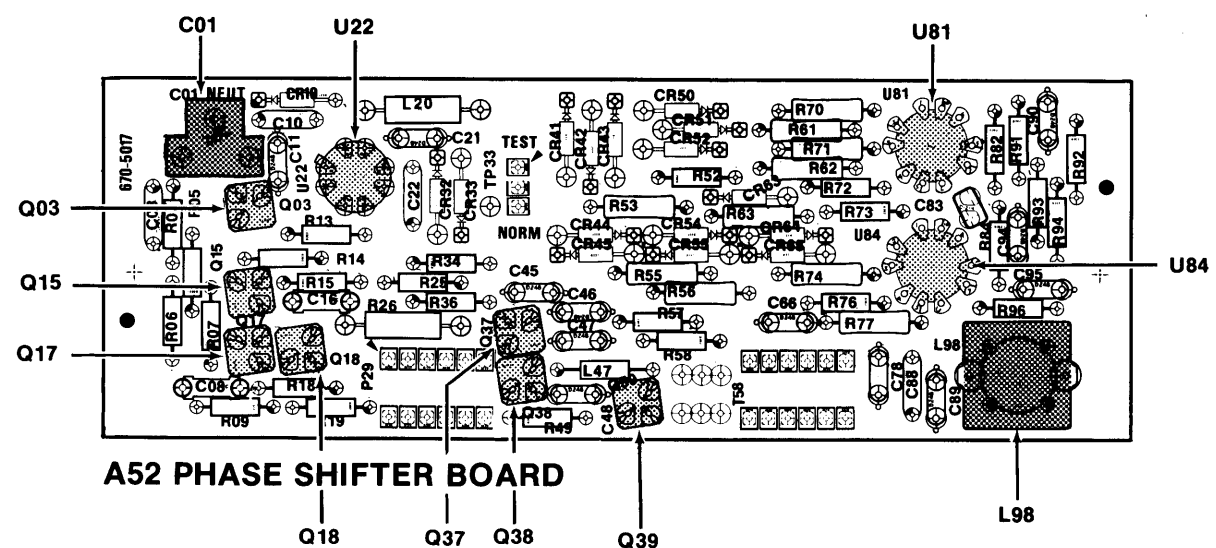
FIG. 8-6. CIRCUIT BOARD ADJUSTMENT AND JUMPER LOCATIONS.



A50 REFERENCE CONTROL BOARD



A51 REFERENCE OSCILLATOR BOARD



A52 PHASE SHIFTER BOARD

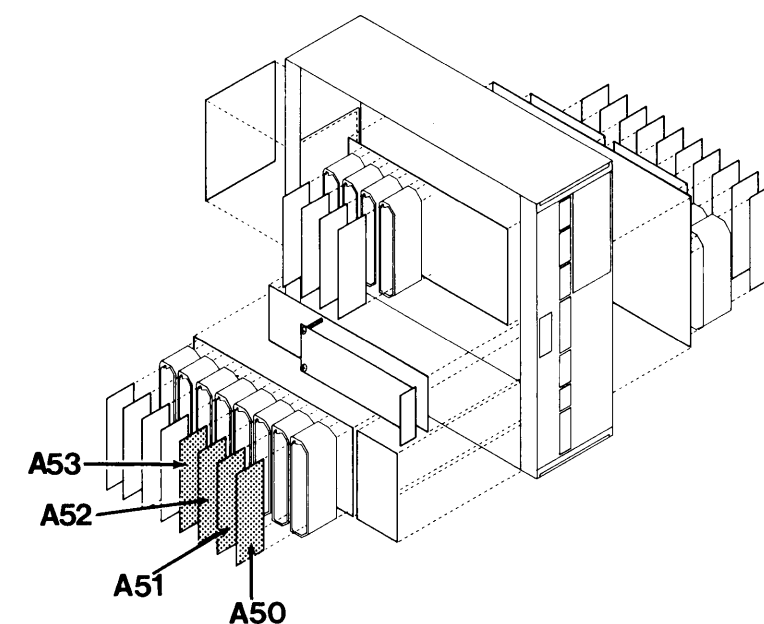


FIG. 8-7. CIRCUIT BOARD ADJUSTMENT LOCATIONS.

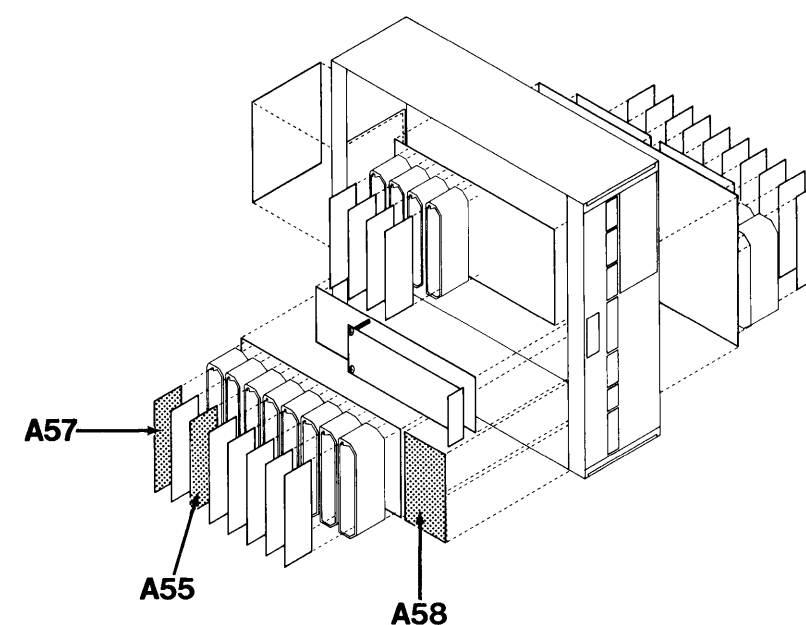
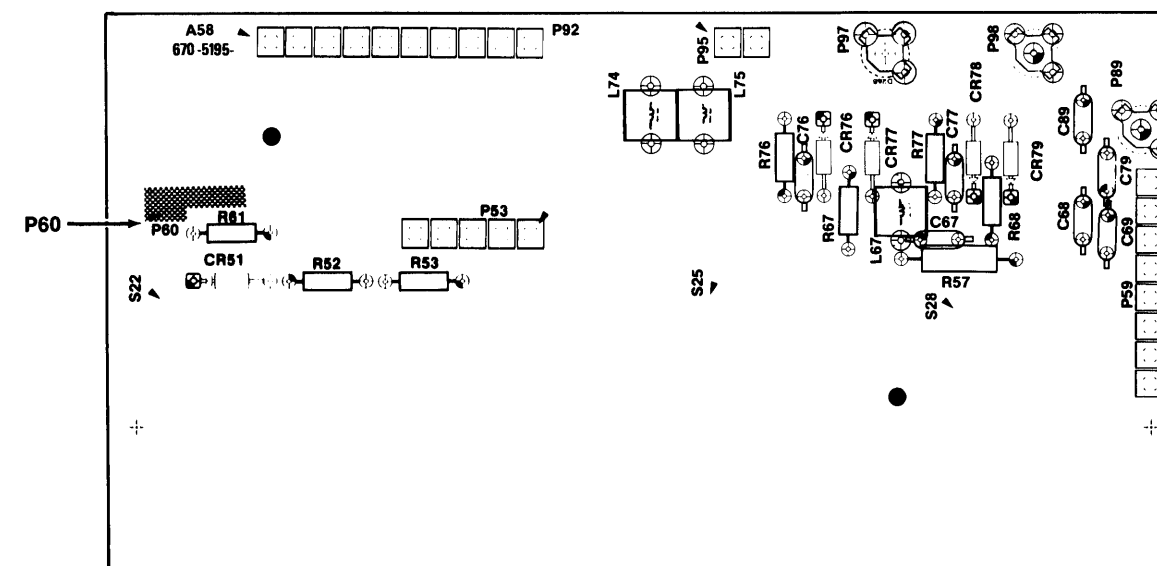
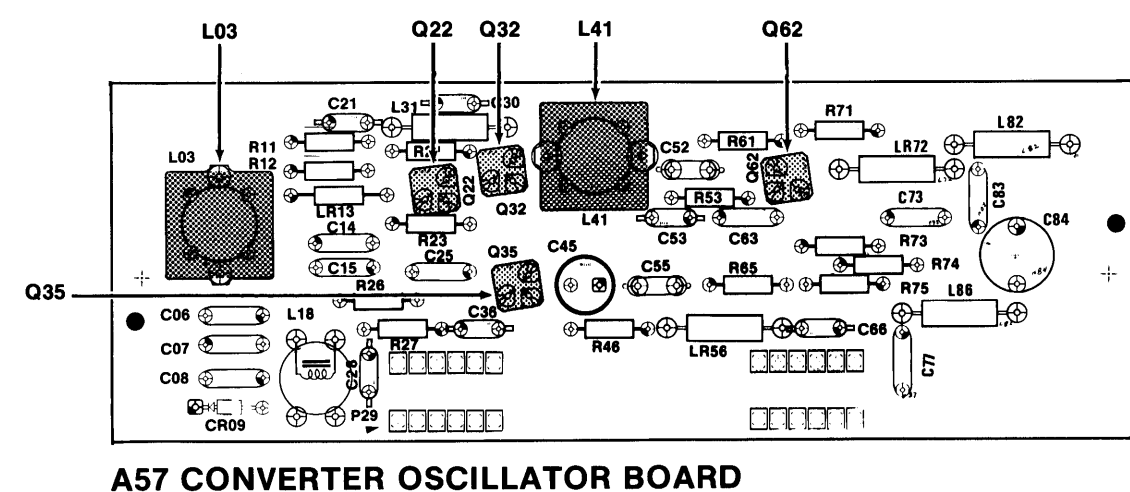
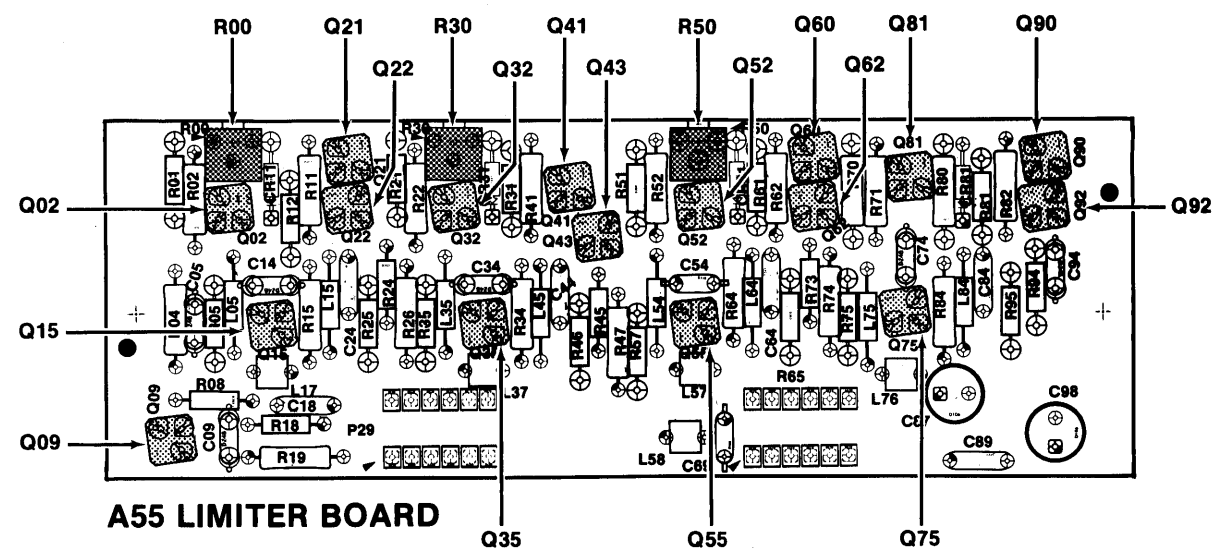


FIG. 8-8. CIRCUIT BOARD ADJUSTMENT AND JUMPER LOCATIONS.



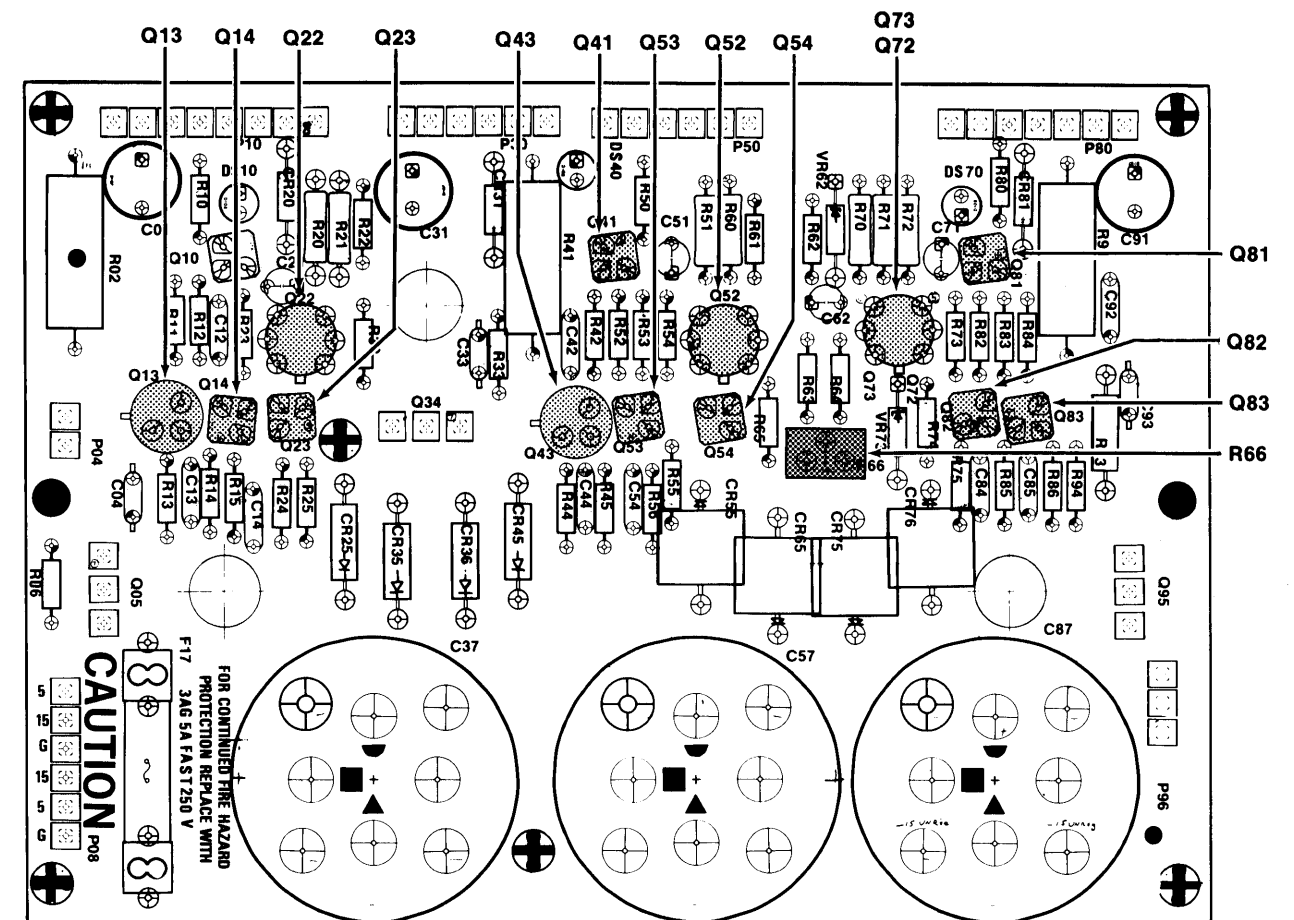
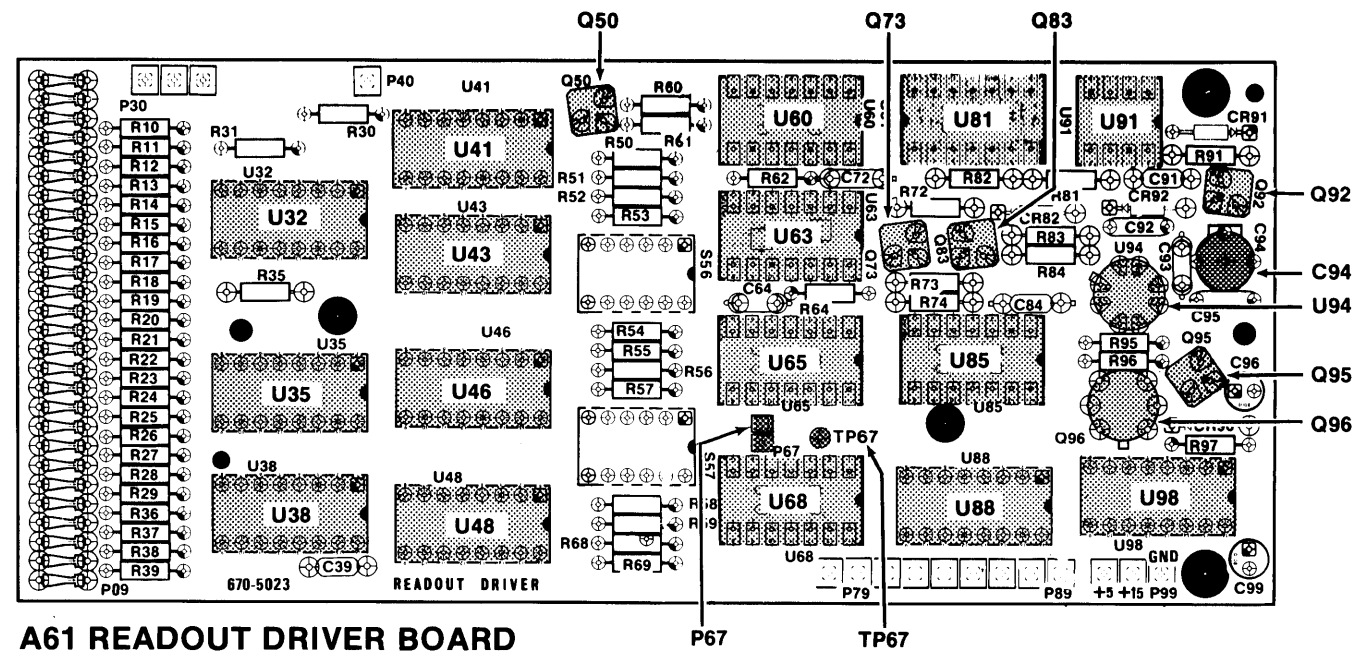
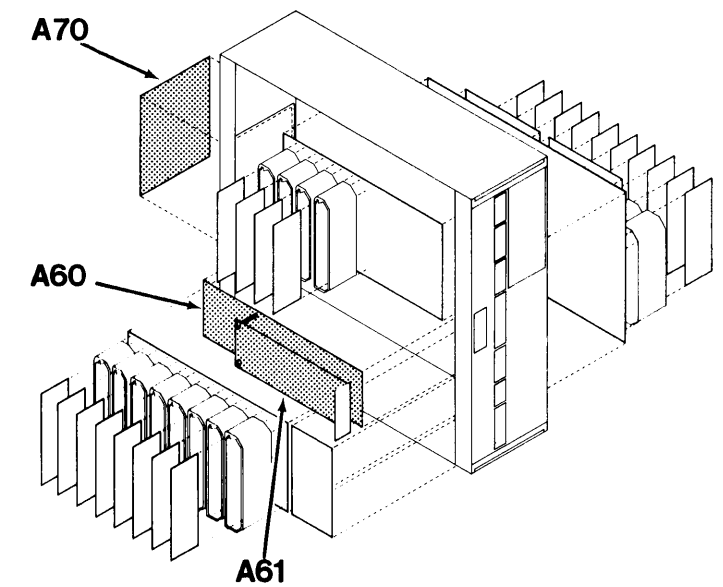
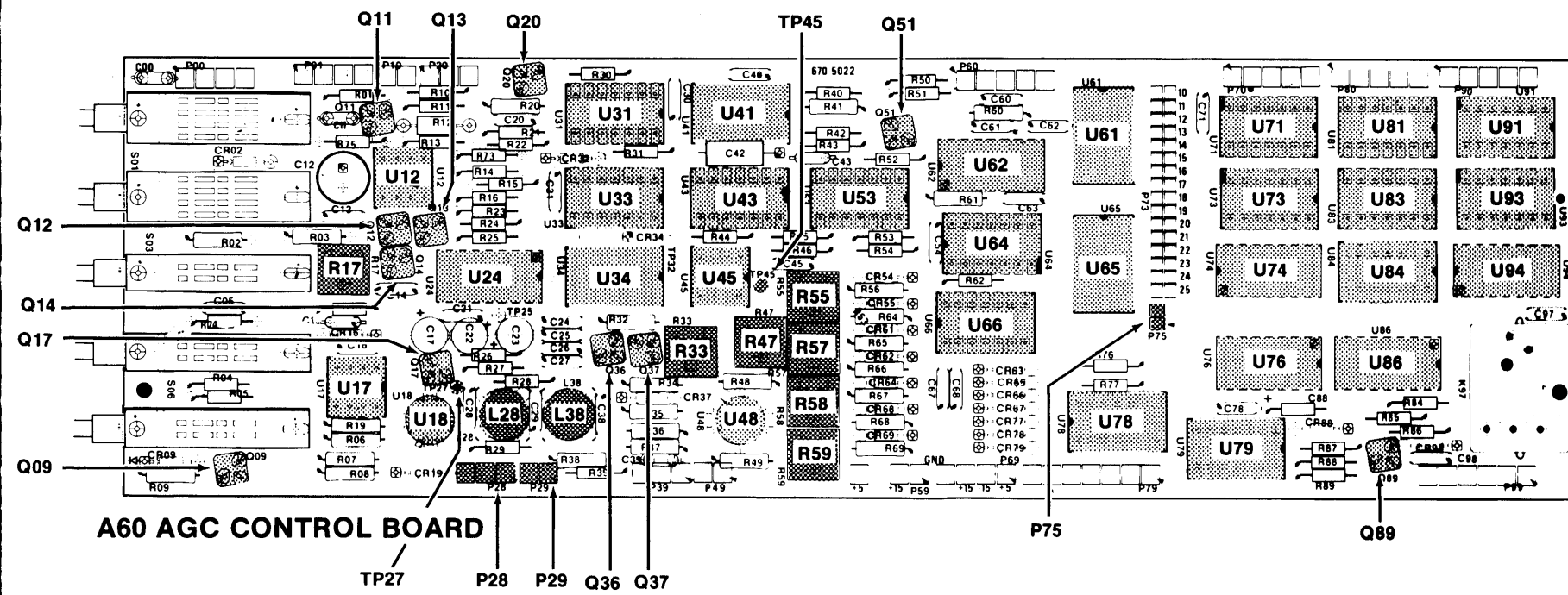
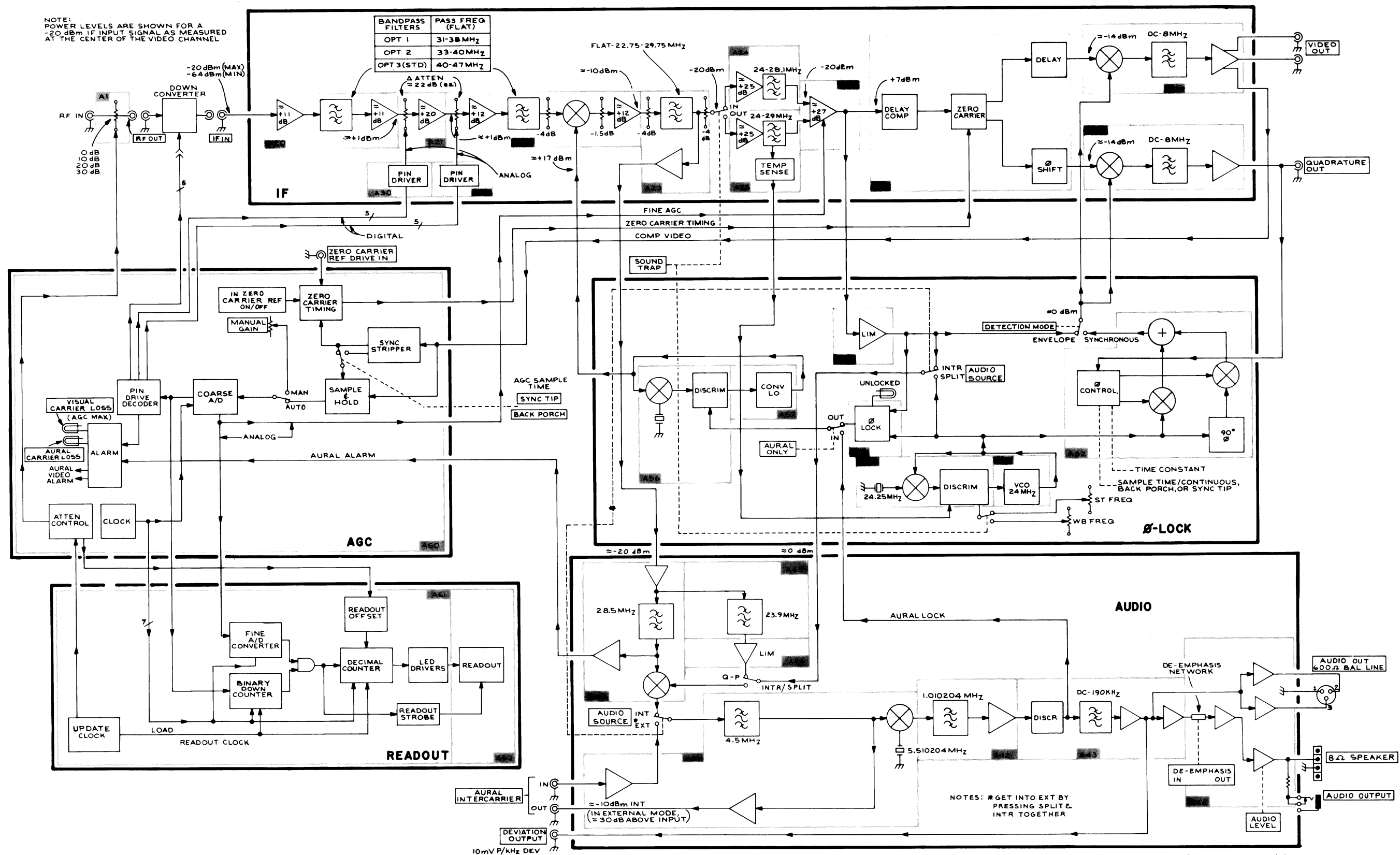


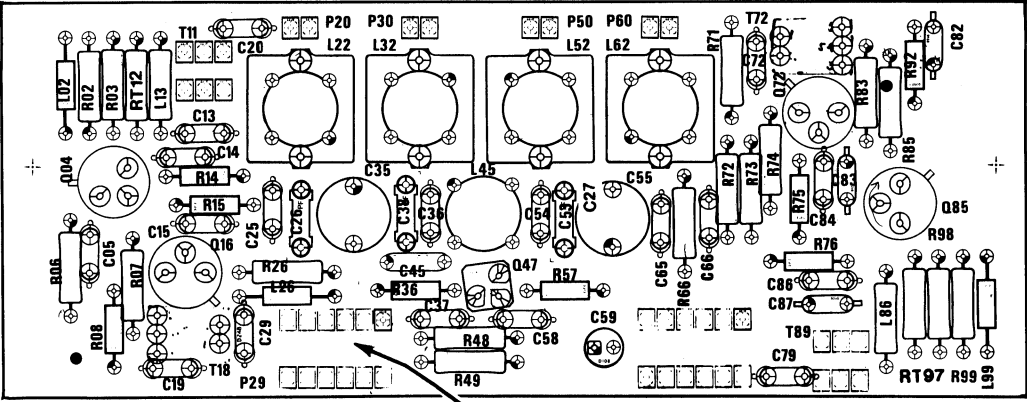
FIG. 8-9. CIRCUIT BOARD ADJUSTMENT AND LOCATIONS.

NOTE:  
POWER LEVELS ARE SHOWN FOR A  
-20 dBm IF INPUT SIGNAL AS MEASURED  
AT THE CENTER OF THE VIDEO CHANNEL



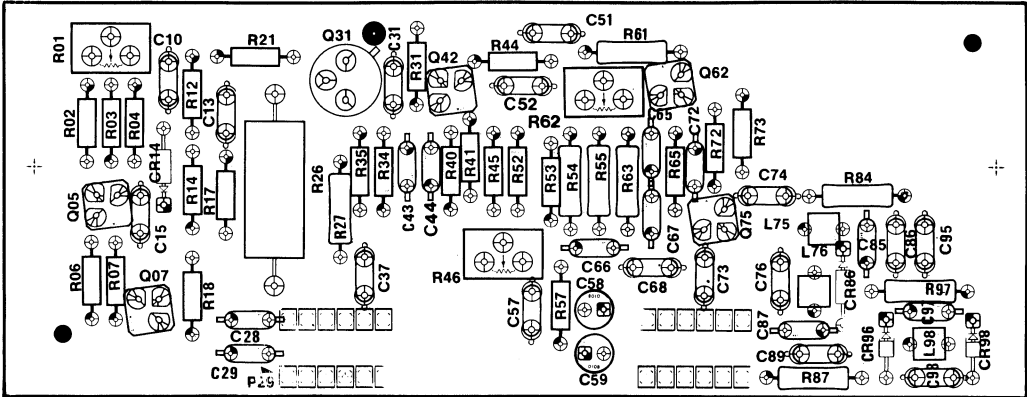
A B C D E F G H I J K L M

1  
2  
3  
4  
5  
6  
7  
8  
9

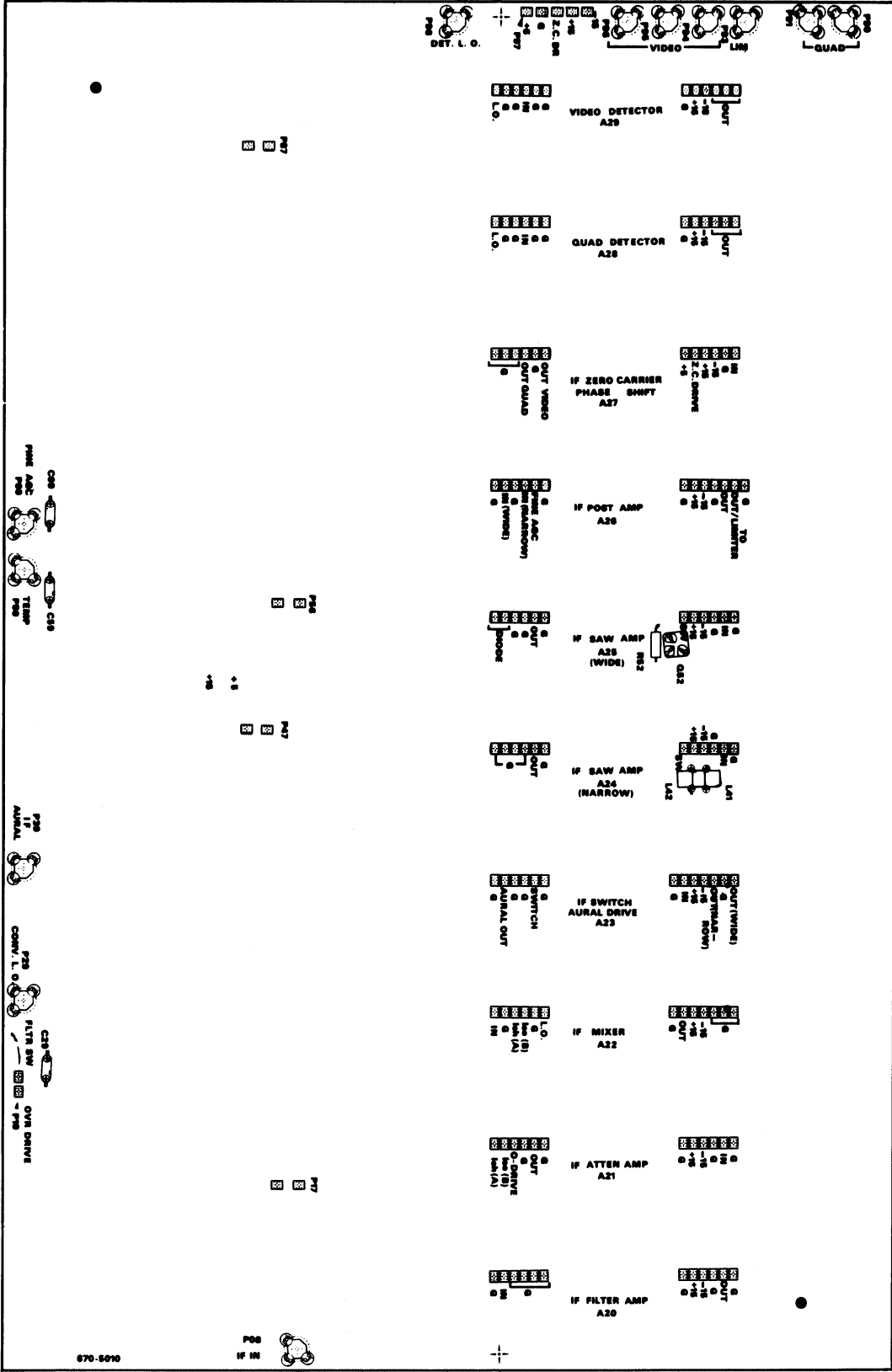


A20 IF FILTER AMP BOARD

C28B  
R28B  
(On back  
of board)



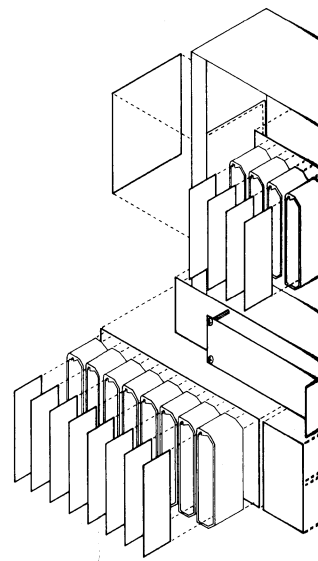
A21 IF ATTENUATOR-AMPLIFIER BOARD

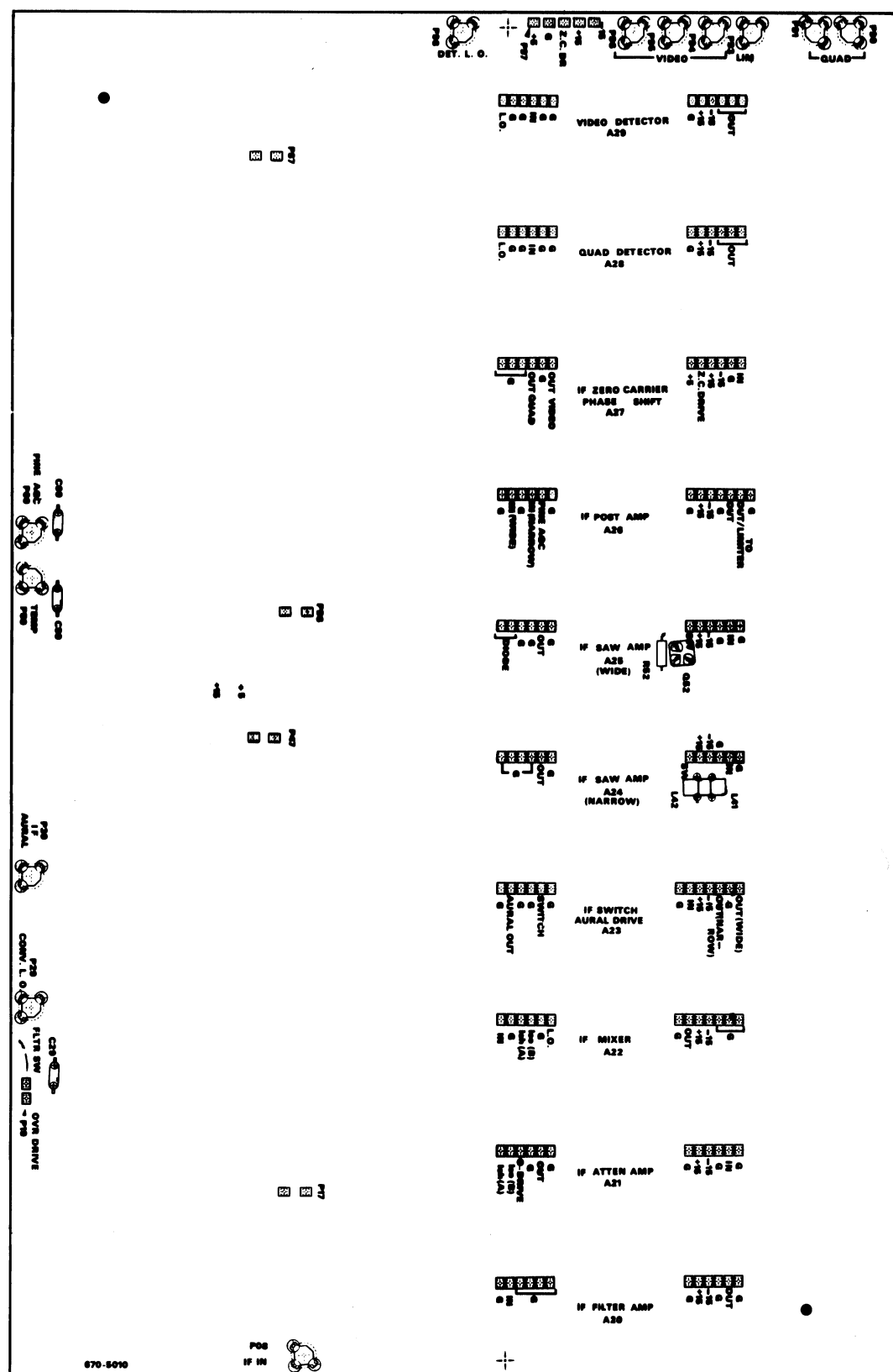


A32 IF INTERFACE BOARD

C23, C24  
(On back  
of board)

Circuit Number	Schematic Location
ASSY A20	
C05	B2
C13	A2
C14	A2
C15	A1
C19	A2
C20	A3
C25	B3
C26	B3
C28B	B1
C29	B1
C35	B3
C36	A3
C37	A1
C38	A3
C45	B3
C53	A3
C54	A3
C55	B3
C58	A1
C59	A4
C65	B3
C66	A4
C72	A4
C79	A5
C82	A4
C83	A4
C84	A4
C86	A5
C87	A5
L02	A2
L22	A3
L26	B1
L32	A3
L45	B3
L52	A3
L62	A3
L99	A5
LR13	B2
LR86	A5
Q04	B1
Q16	B1
Q47	A1
Q72	A4
Q85	A5
R02	A2
R03	A2
R06	B2
R07	B2
R08	A2
R14	A2
R15	A1





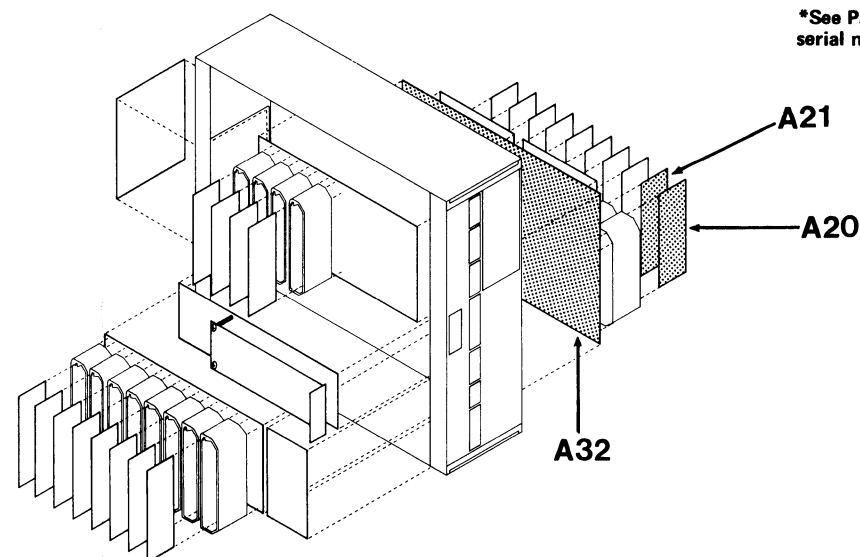
### A32 IF INTERFACE BOARD

**C23, C24**  
**(On back**  
**of board)**

REV APR 1990

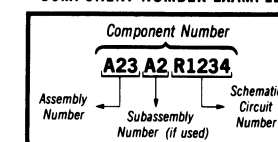
			IF Input <div>1</div>						
Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location	
ASSY A20			R26	B1	B2	CR86 CR96 CR98	C2	E9	
C05	B2	A2	R28B	B1	B3		C2	E9	
C13	A2	B1	R36	A1	C2		C2	F9	
C14	A2	B2	R48	A1	C3				
C15	A1	B2	R49	A1	C3				
C19	A2	B3	R57	A1	D2		E42	C3	
C20	A3	B1	R66	A4	D2				
C25	B3	B2	R71	A4	D1		L75	C2	E8
C26	B3	B2					L76	C2	E8
C28B	B1	B3	R73	A4	E2		L98	C2	F9
C29	B1	B3	R74	A4	E2				
C35	B3	C2	R75	A4	E2				
C36	A3	C2	R76	A5	E2				
C37	A1	C2	R83	A4	E1	Q31	C4	B7	
C38	A3	C2	R85	A4	E2	Q42	C3	C7	
C45	B3	C2	R92	A4	E1	Q62	C3	D7	
C53	A3	D2	R98	A5	F2	Q75	C2	E8	
C54	A3	C2	R99	A5	F3				
C55	B3	D2	RT12	A2	A1				
C58	A1	C3	RT97	A5	E3				
C59	A4	D2							
C65	B3	D2	T11	B1	B1				
C66	A4	D2	T18	B2	B3				
C72	A4	E1	T72	A4	E1				
C79	A5	E3	T89	A5	E3				
C82	A4	F1	ASSY A21						
C83	A4	E2	C10	D4	B7	R21	D4	B7	
C84	A4	E2	C13	C4	B8	R26	C4	B8	
C86	A5	E2	C27*	B4	D2	R27	C4	B8	
C87	A5	E2	C28	D1	B9	R31	C3	C7	
L02	A2	A1	C29	C1	B9	R34	C4	C8	
L22	A3	B1	C31	C3	C7	R35	C4	C8	
L26	B1	B2	C37	C4	C9	R40	D3	C8	
L32	A3	C1	C43	D4	C8	R41	C3	C8	
L45	B3	C2	C44	D3	C8	R44	C3	C7	
L52	A3	D1	C51	C3	D7	R45	C3	C8	
L62	A3	D1	C52	C3	C8	R46	D3	C9	
L99	A5	F3	C57	D3	C9	R52	C3	C8	
LR13	B2	A1	C58	D3	D9	R53	D3	D8	
LR86	A5	E2	C59	C5	D9	R54	D3	D8	
Q04	B1	A2	C65	C3	D8	R55	D3	D8	
Q16	B1	B2	C66	D3	D8	R57	D3	D9	
Q47	A1	C2	C67	D3	D8	R61	C3	D7	
Q72	A4	E1	C68	C3	D9	R62	C3	D8	
Q85	A5	F2	C72	C3	D8	R63	D3	D8	
R02	A2	A1	C73	C3	D9	R65	D2	D8	
R03	A2	A1	C74	C2	E8	R72	C3	D8	
R06	B2	A2	C76	C2	E9	R73	C3	E8	
R07	B2	A2	C85	C2	E8	R84	C2	E8	
R08	A2	A3	C86	C2	E8	R87	C2	E9	
R14	A2	B2	C87	C2	E9	R97	C2	F9	
R15	A1	B2	C89	C2	E9	P/O ASSY A32			
			C95	C2	F8	J1	B1	CHASSIS	
			C97	D2	F9	P08	B1	I9	
			C98	C2	F9				

</



**\*See Parts List for  
serial number ranges.**

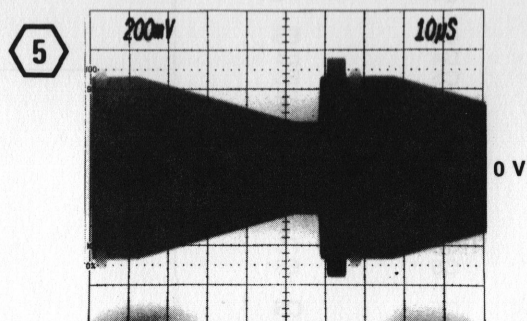
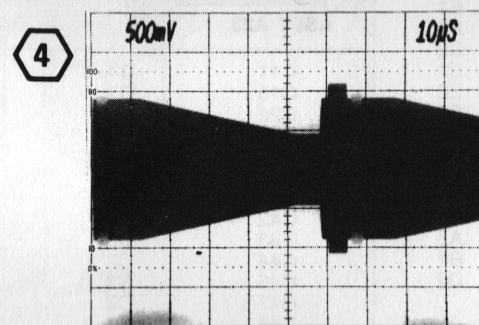
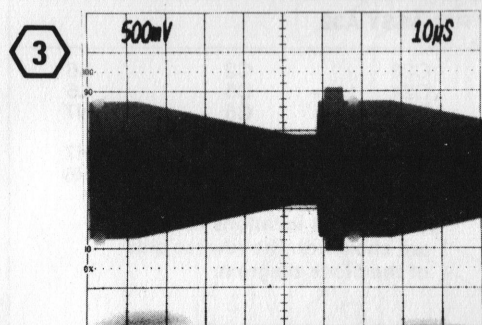
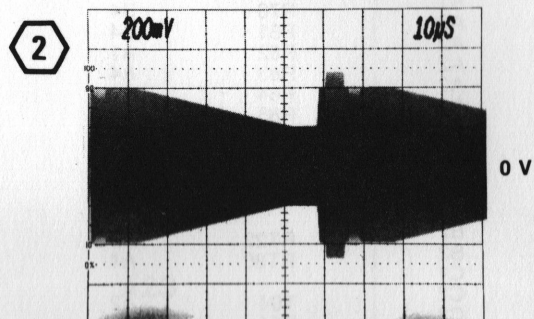
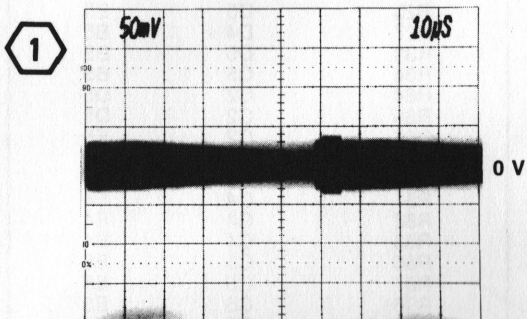
**COMPONENT NUMBER EXAMPLE**



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

 **Static Sensitive Devices**  
See Maintenance Section

1





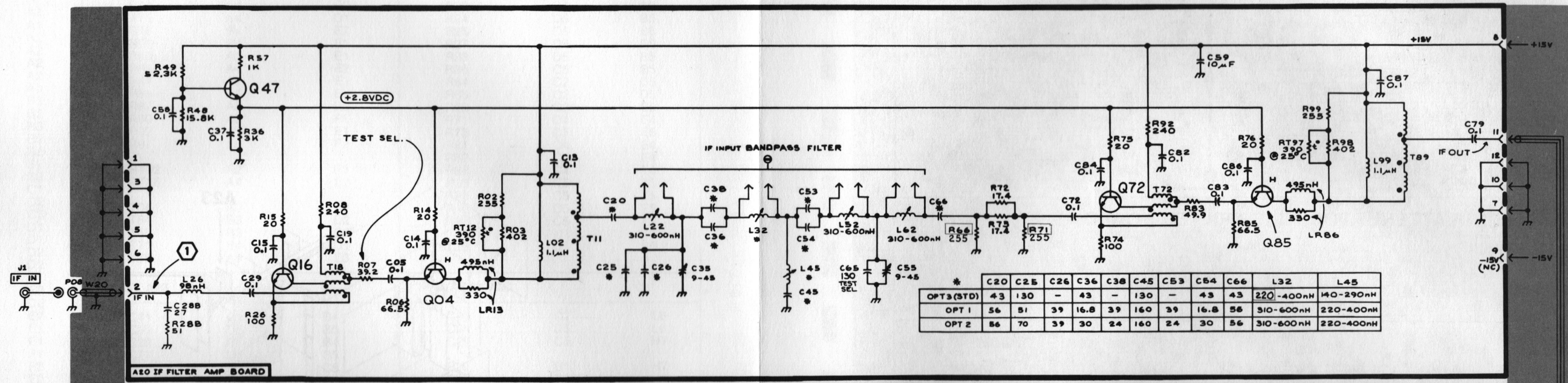
1 2 3 4 5

A

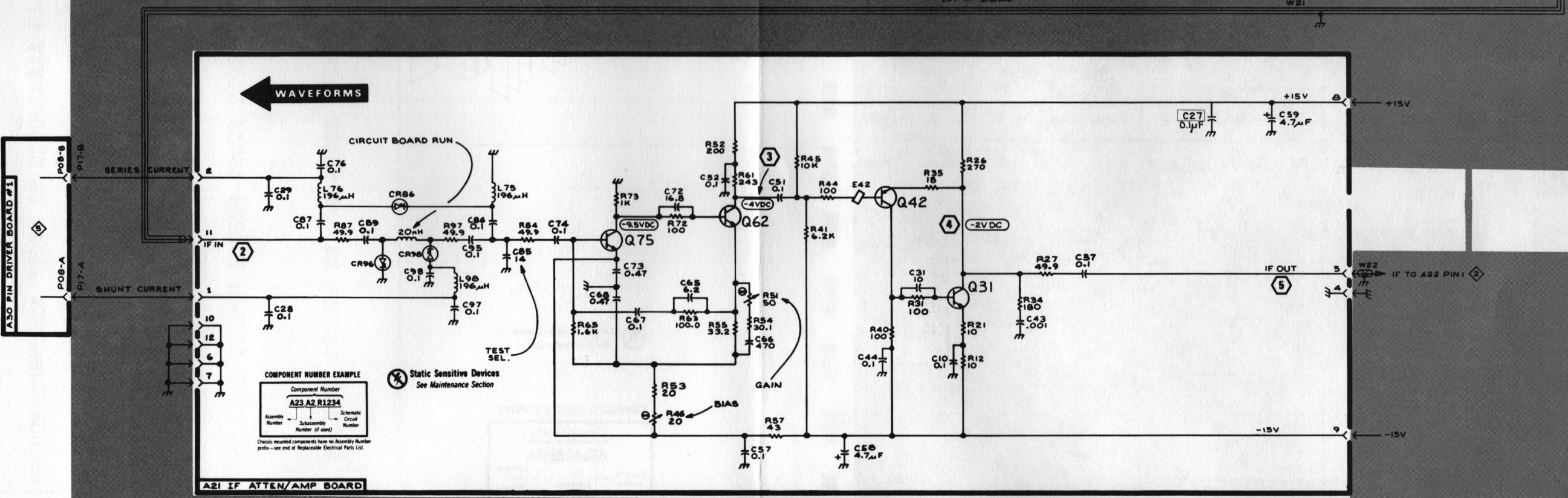
B

C

D



A20 IF FILTER AMP BOARD



A21 IF ATTN/AMP BOARD

PART OF A32 IF INTERFACE BOARD

5568-34  
REVISED AUG 88

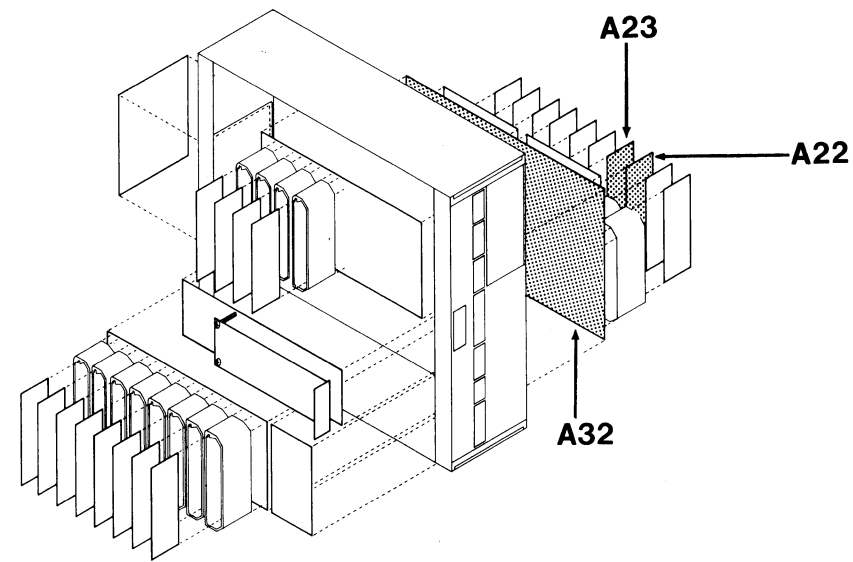
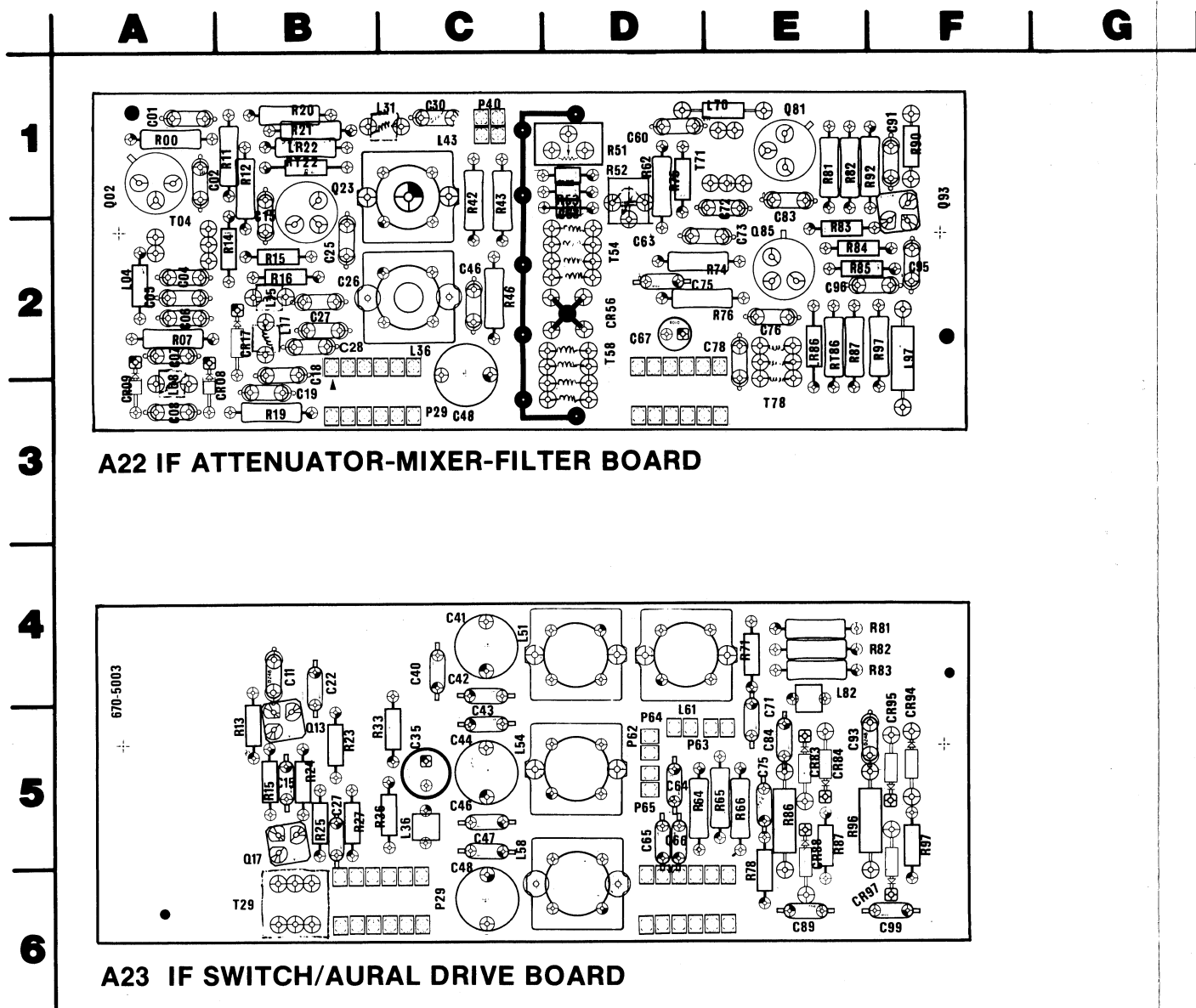
1450-1

IF INPUT

1

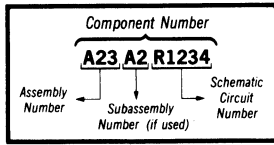
IF INPUT A20, A21, A32

1



Static Sensitive Devices  
See Maintenance Section

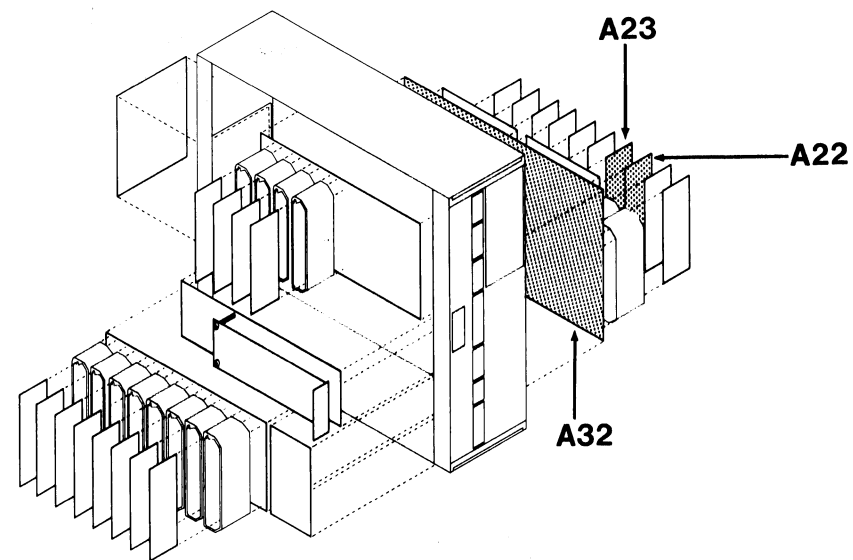
COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

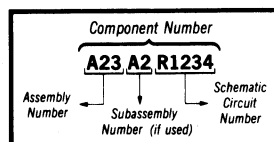
Circuit Number	Schematic Location	
ASSY A22		
C01	B2	
C02	A2	
C04	A2	
C05	A1	
C06	A1	
C07	A1	
C08	B1	
C15	A2	
C18	A1	
C19	A1	
C25	B3	
C26	A2	
C27	A1	
C28	B1	
C30	B3	
C46	B3	
C48	B3	
C53	A4	
C60	B4	
C63	B4	
C67	B5	
C72	A4	
C73	B4	
C75	B4	
C76	A4	
C78	A5	
C83	A4	
C91	B3	
C95	A1	
C96	A2	
CR08	B1	
CR09	B1	
CR17	A1	
CR56	B3	
L04	A2	
L08	B1	
L15	A1	
L17	A1	
L31	A3	
L33*	A3	
L36	A3	
L43	A3	
L70	B4	
L97	A5	
LR22	A2	
LR86	B5	
Q02	A2	
Q23	A2	
Q81	B4	
Q85	B4	
Q93	A2	
R00	A2	
R07	B2	
R11	A2	
R12	A2	
R14	A2	
R15	A2	
R16	A2	
R19	A1	
R20	A2	
R21	A2	
R42	A3	
R43	A3	
R46	A3	
R51	B3	
R52	B3	





⚡ Static Sensitive Devices  
See Maintenance Section

#### COMPONENT NUMBER EXAMPLE



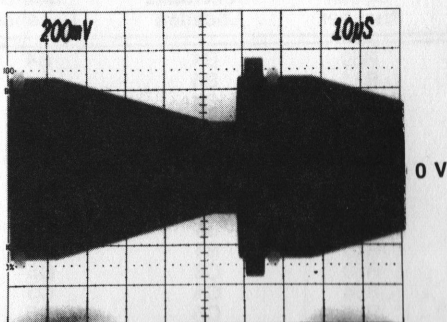
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

IF Mixer & Aural Drive 2								
Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
ASSY A22			R53	B3	D1	R13	D4	B5
C01	B2	A1	R62	B4	D1	R15	D5	B5
C02	A2	A1	R74	B4	E2	R23	D4	B5
C04	A2	A2	R75	A4	D1	R24	D5	B5
C05	A1	A2	R76	B4	E2	R25	D5	B5
C06	A1	A2	R81	B4	E1	R27	D4	B5
C07	A1	A2	R82	A1	E1	R33	D5	B5
C08	B1	A3	R83	A4	E2	R36	C5	B5
C15	A2	B1	R84	A2	E2	R64	C2	D5
C18	A1	B2	R85	A4	E2	R65	C2	D5
C19	A1	B3	R87	A5	E2	R66	C2	E5
C25	B3	B2	R90	A2	F1	R71	D4	E4
C26	A2	B2	R92	A1	E1	R78	C5	E5
C27	A1	B2	R97	A5	F2	R81	C4	E4
C28	B1	B2	RT22	A2	B1	R82	C4	E4
C30	B3	C1	RT86	A4	E2	R83	C4	E4
C46	B3	C2				R86	C5	E5
C48	B3	C3	T04	A2	A2	R87	C5	E5
C53	A4	D1	T54	B3	D2	R96	C5	E5
C60	B4	D1	T58	B3	D2	R97	C5	F5
C63	B4	D2	T71	B4	D1			
C67	B5	D2	T78	A5	E3			
C72	A4	E1	ASSY A23			P/O ASSY A32		
C73	B4	E2	C11	D4	B4	C23	C2	L6
C75	B4	D2	C15	D5	B5	C24	D5	L6
C76	A4	E2	C22	D4	B4	C29	C5	H7
C78	A5	E2	C27	D4	B5			
C83	A4	E1	C35	D5	C5	P29	B1	H7
C91	B3	F1	C40	C3	C4	P39	D5	H6
C95	A1	F2	C41	C3	C4	Component locations for A32 are shown on the reverse side of the block diagram.		
C96	A2	E2	C42	C3	C4			
CR08	B1	A3	C43	C3	C4			
CR09	B1	A3	C44	C3	C5			
CR17	A1	B2	C46	C3	C5			
CR56	B3	D2	C47	C3	C5			
L04	A2	A2	C48	C3	C5			
L08	B1	A3	C64	C3	D5			
L15	A1	B2	C65	C2	D5			
L17	A1	B2	C66	D5	D5			
L31	A3	B1	C71	C4	E4			
L33*	A3	G1						
L36	A3	C2	C75	C5	E5			
L43	A3	C1	C84	C4	E5			
L70	B4	E1	C89	C5	E6			
L97	A5	F2	C93	C4	E5			
LR22	A2	B1	C99	C5	F6			
LR86	B5	E2	CR83	C5	E5			
Q02	A2	A1	CR84	C4	E5			
Q23	A2	B1	CR88	C5	E5			
Q81	B4	E1	CR94	C4	F5			
Q85	B4	E2	CR95	C5	F5			
Q93	A2	F1	CR97	C5	E6			
R00	A2	A1	L36	D5	C5			
R07	B2	A2	L51	C3	C4			
R11	A2	B1	L54	C3	C5			
R12	A2	B1	L58	C3	C5			
R14	A2	B2	L61	C4	D4			
R15	A2	B2	L82	C4	E4			
R16	A2	B2						
R19	A1	B3	P62	C3	D5			
R20	A2	B1	P63	C4	D5			
R21	A2	B1	P64	C3	D5			
R42	A3	C1	P65	C3	D5			
R43	A3	C1						
R46	A3	C2	Q13	D4	B5			
R51	B3	D1	Q17	D5	B5			
R52	B3	D1						

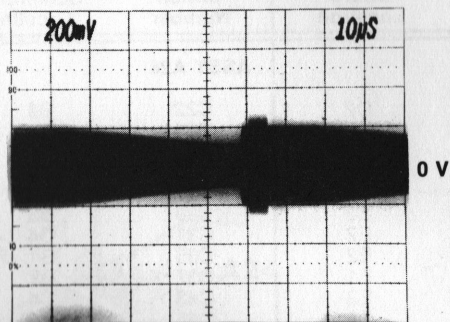


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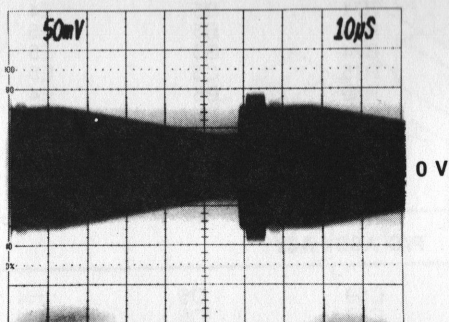
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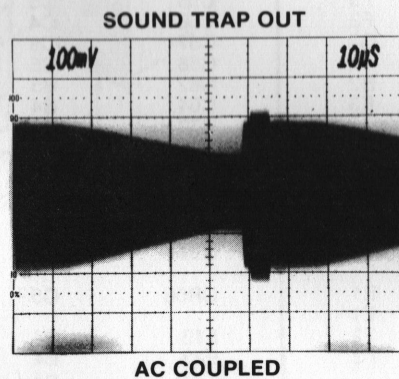
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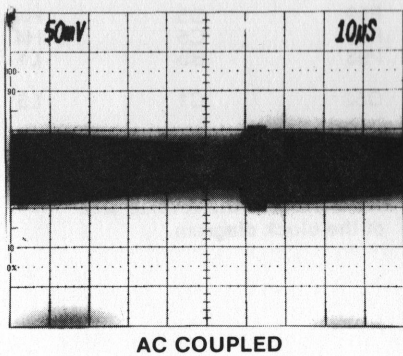
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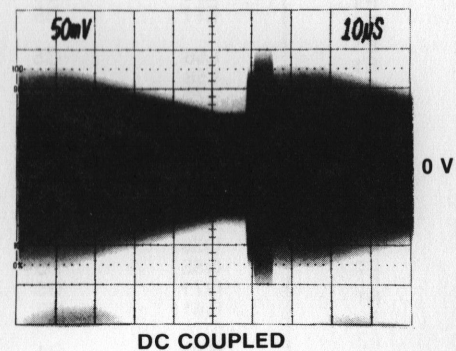
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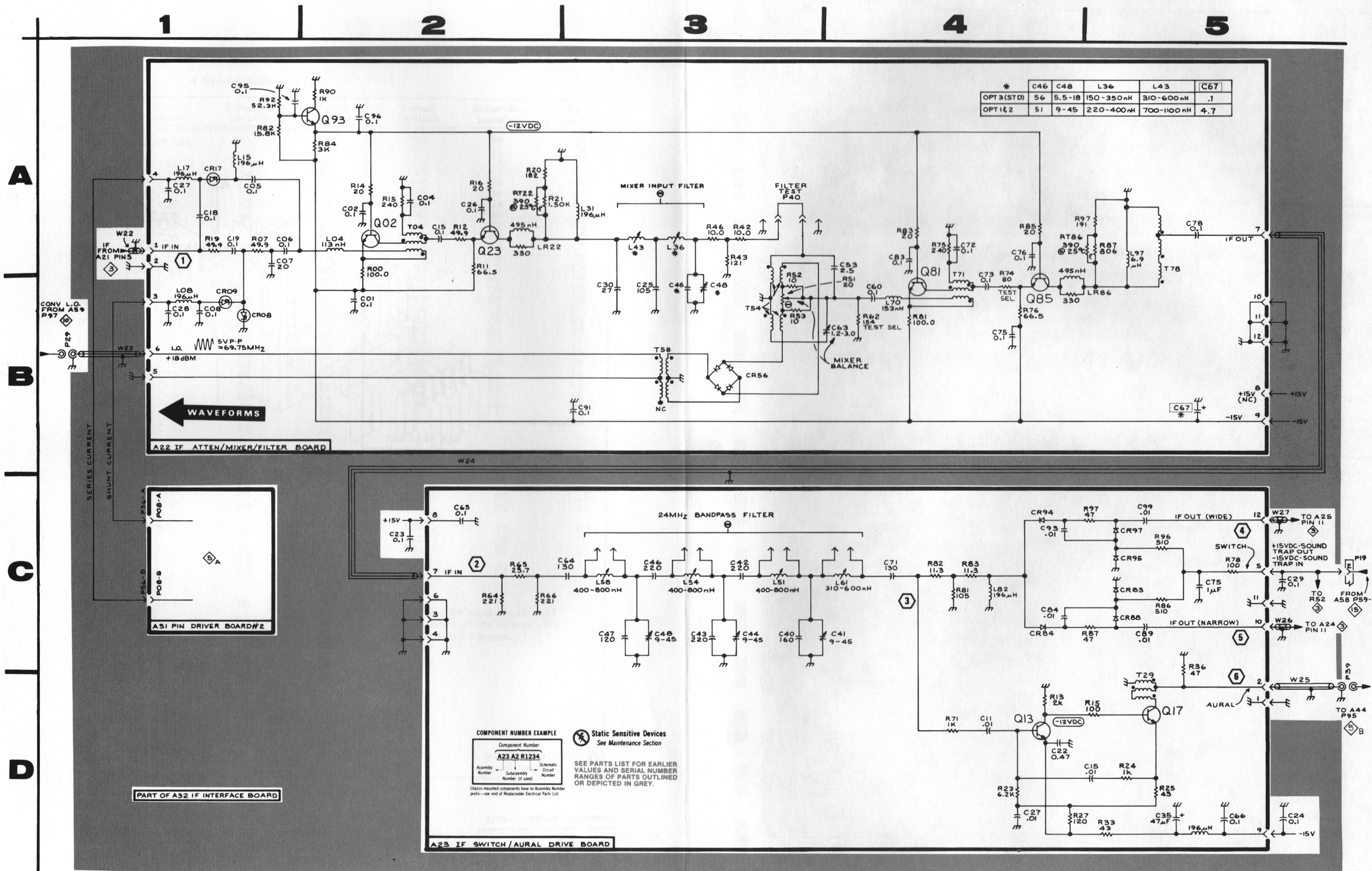
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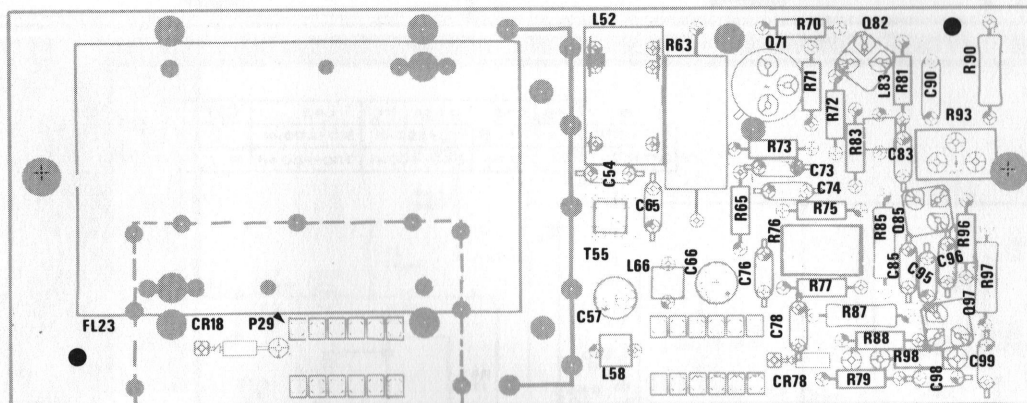


A B C D E F

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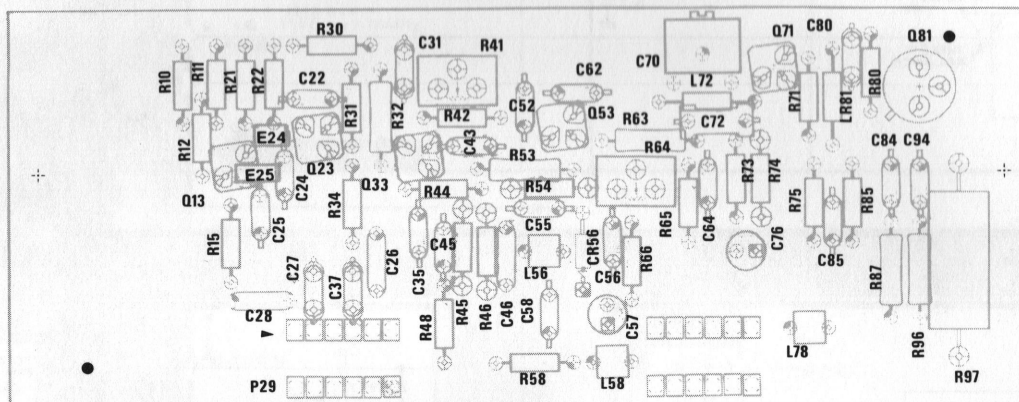


A24 IF SAW AMPLIFIER (NARROW BAND) BOARD  
A25 IF SAW AMPLIFIER (WIDE BAND) BOARD

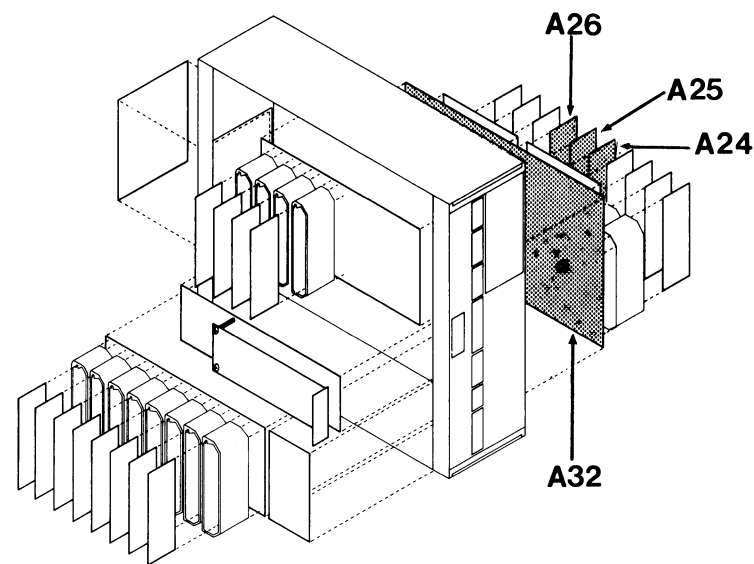
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A26 IF POST AMPLIFIER BOARD

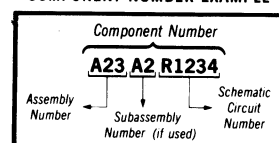


IF Nyquist Filtering 3								
Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
ASSY A24, 25			ASSY A26			R30	B4	B4
C54	A3,B3	D2	C22	B4	B4	R31	B4	C4
C57	A2,B2	D2	C24	B4	B5	R32	C4	C4
C65	A2,C2	D2	C25	B4	B5	R34	B3	B5
C66	B3,C3	D2	C26	B3	C5	R41	C4	C4
C73	B2,C2	E2	C27	C3	B5	R42	B4	C4
C74	B2,C2	E2	C28	B3	B5	R44	C4	C5
C76	B1,C1	E2	C31	C4	C4	R45	B4	C5
C78	A1,C1	E2	C35	B4	C5	R46	B4	C5
C83	A2,C2	E1	C37	B3	B5	R48	B4	C5
C85	B1,C1	E2	C43	C4	C5	R53	C5	C5
C90	A2,B2	F1	C45	B4	C5	R54	C4	C5
C95	B1,C1	F2	C46	B4	C5	R58	C5	C6
C96	A1,C1	F2	C52	C5	C4	R63	B5	D4
C96*	B1,C1	F3	C55	C5	C5	R64	C4	D5
C98	A1,C1	F3	C56	C4	D5	R65	B5	D5
C99	B1,C1	G3	C57	C5	D5	R66	C5	D5
CR18	A3,C3	B2	C58	C5	C5	R71	B5	E4
CR78	B1,C1	E3	C62	B5	D4	R73	B5	E5
FL23	A3,B3	A2	C64	B4	D5	R74	B5	E5
L52	A3,C3	D1	C70	B5	D4	R75	C5	E5
L58	A3,B3	D3	C72	B5	D4	R80	B5	E4
L66	B3,C3	D2	C76	B5	E5	R85	B5	E5
L83	A1,B1	E1	C80	B5	E4	R87	B5	E5
Q71	B2,C2	E1	C84	C5	E5	R96	B5	E5
Q82	A2,C2	E1	C85	C5	E5	R97	B5	F6
Q85	A2,C2	E2	C94	B5	E5	P/O ASSY A32		
Q97	B1,C1	F2	CR56	C5	D5	C59	D5	H4
R63	A2,B2	D1	E13	B4	B5	C69	C5	H4
R65	B2,C2	E2	E23	B4	B5	L41	D2	L6
R70	A2,C2	E1	E24*	B4	B5	L42	D2	L6
R71	B2,C2	E1	E25*	B4	B5	P59	D5	H4
R72	B2,C2	E1	E33	B4	C5	P69	C5	H4
R73	B2,C2	E1	E71	B5	E4	P93	B5	L1
R75	A2,C2	E2	L56	C5	C5	Q52	C1	L5
R76	B1,C1	E2	L58	C5	D6	R52	C1	L5
R77	B1,C1	E2	L72	B5	D4	Component locations for A32 are shown on the reverse side of the block diagram.		
R79	A1,C1	E3	L78	B5	E6			
R81	A2,C2	E1	LR81	B5	E4			
R83	A2,B2	E1	Q13	C4	B5			
R85	B2,C2	E2	Q23	B4	B5			
R87	A1,C1	E2	Q33	B4	C5			
R88	B1,C1	E2	Q53	B5	D4			
R90	A2,B2	F1	Q71	B5	E4			
R93	B2,C1	F1	Q81	B5	E4			
R96	A1,C1	F2	R10	B4	B4			
R97	B1,C1	F2	R11	B4	B4			
R98	A1,C1	E3	R12	C4	B5			
T55	A2,C2	D2	R15	B3	B5			
			R21	B4	B4			
			R22	B4	B4			

\*See Parts List for serial number ranges.

Static Sensitive Devices  
See Maintenance Section

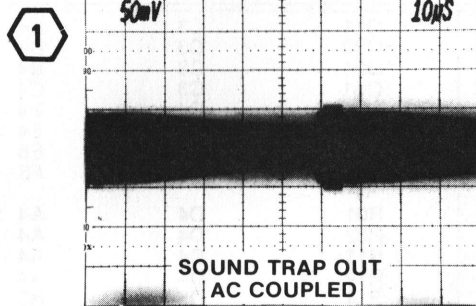
#### COMPONENT NUMBER EXAMPLE



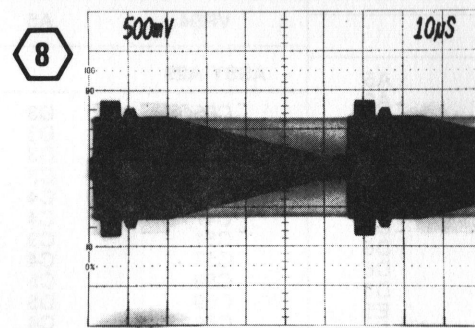
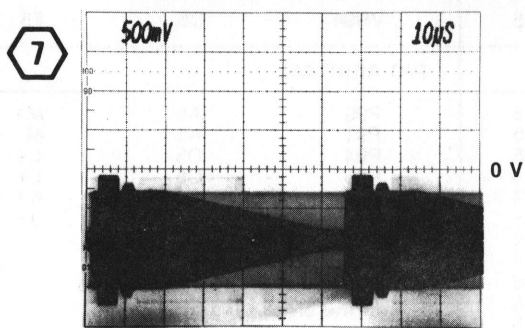
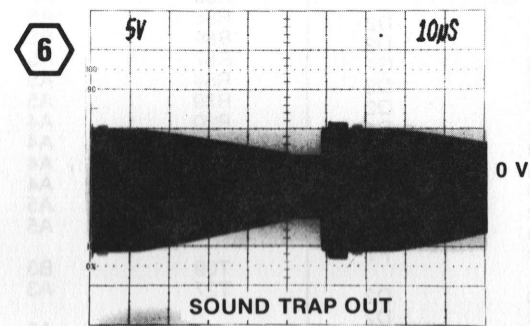
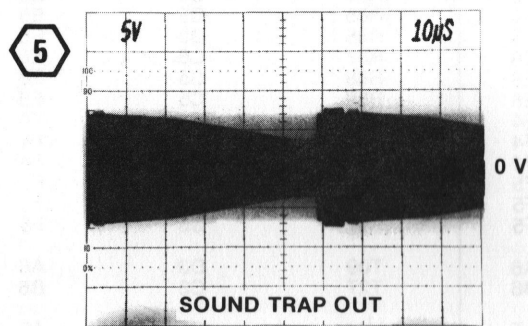
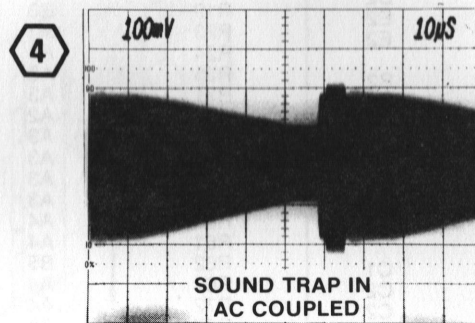
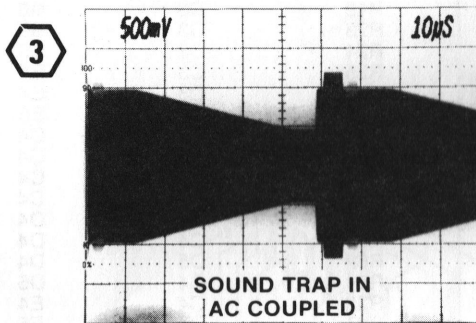
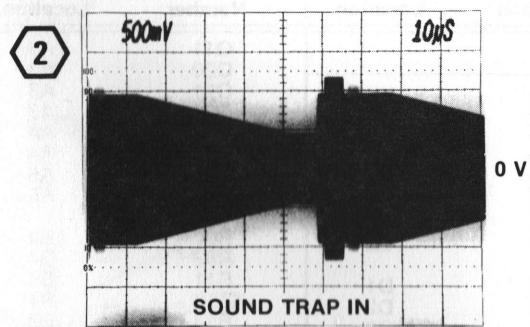
5568-32

REV APR 1990

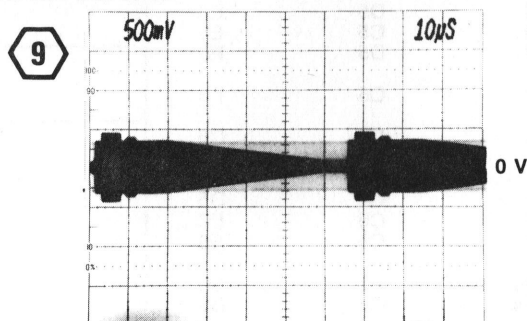
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.



3



DC LEVEL DEPENDS ON R64 SETTING



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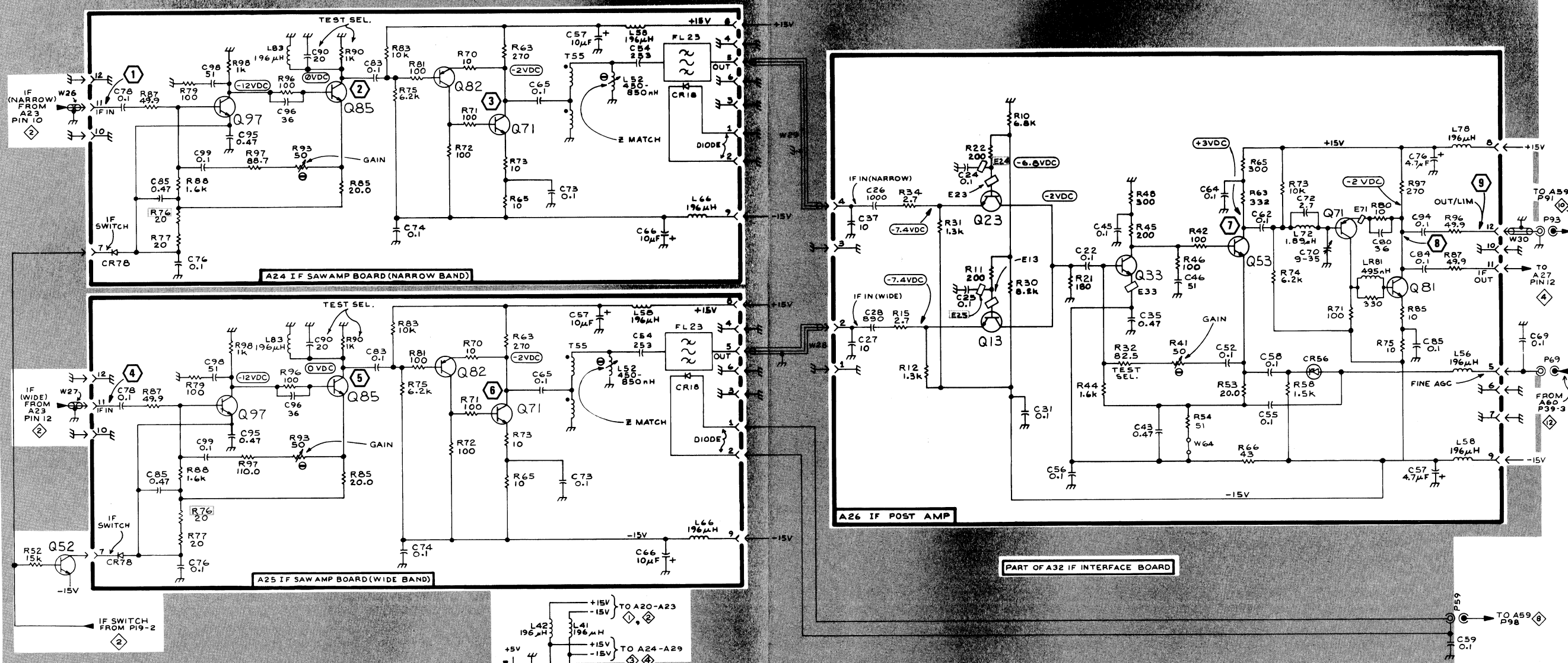
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← WAVEFORMS



SEE PARTS LIST FOR EARLIER VALUES AND SERIAL NUMBER RANGES OF PARTS OUTLINED OR DEPICTED IN GREY.

Static Sensitive Devices  
See Maintenance Section

1450-1

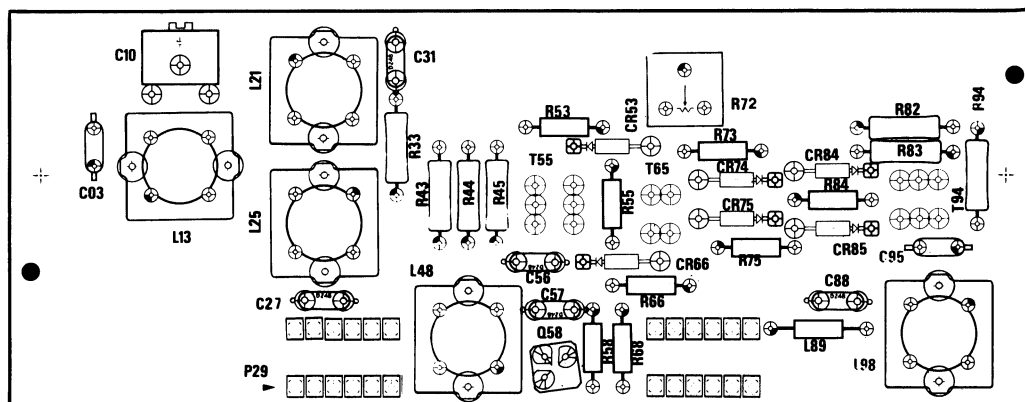
5568-36  
REV MAR 1990

IF NYQUIST FILTERING

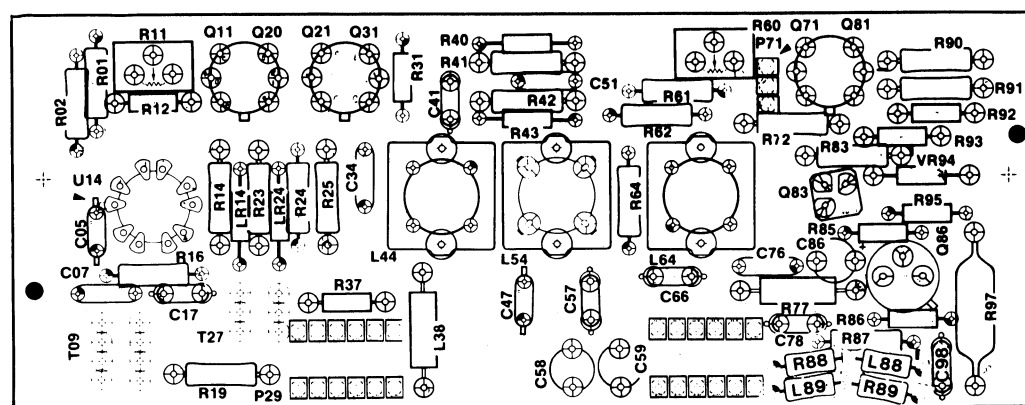
IF NYQUIST FILTERING  
A24, A25, A26, A32



**A** | **B** | **C** | **D** | **E** | **F** | **G**

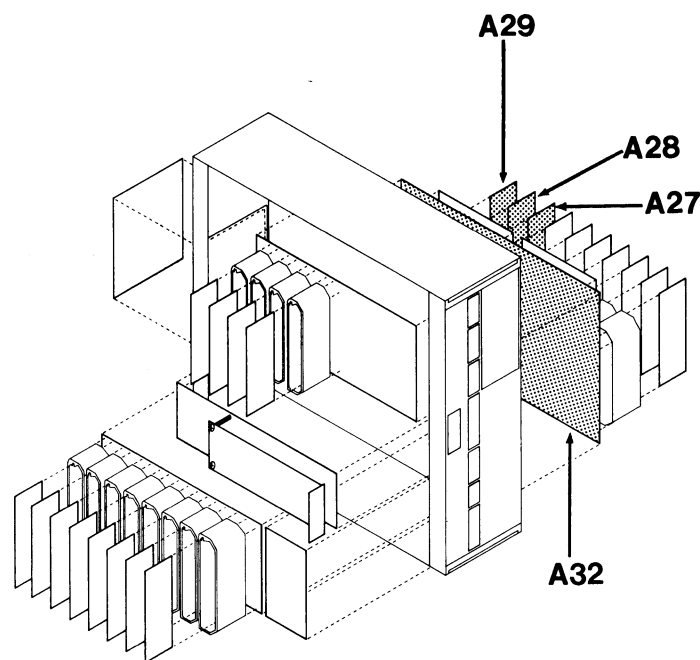
**1****2****3**

**A27 IF ZERO CARRIER/PHASE SHIFTER BOARD**

**4****5****6**

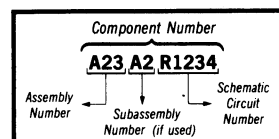
**A28 IF DETECTOR-VIDEO AMPLIFIER (QUADRATURE) BOARD**  
**A29 IF DETECTOR-VIDEO AMPLIFIER (VIDEO) BOARD**

**7****8****9**




 **Static Sensitive Devices**  
See Maintenance Section

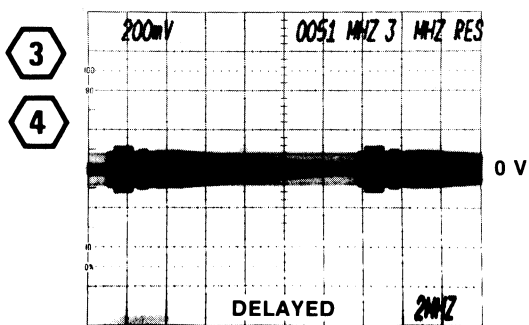
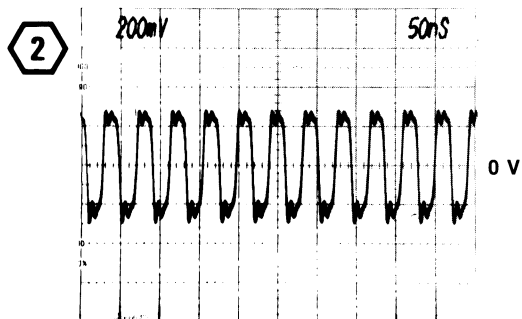
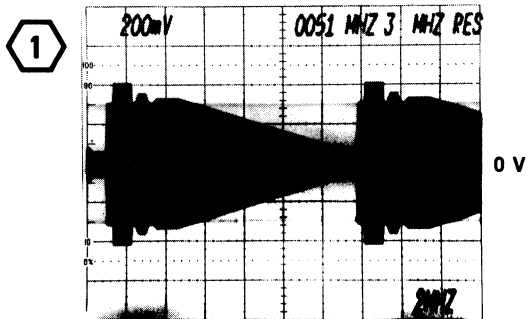
#### COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

IF Detection 								
Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
<b>ASSY A27</b>			Q11	A3	B4	Q11	C3	B4
C03	B2	A2	Q20	A3	B4	Q20	C3	B4
C10	B2	A1	Q21	A3	B4	Q21	C3	B4
C27	B2	B2	Q31	A3	C4	Q31	C3	C4
C31	B2	C1	Q71	A4	E4	Q71	C4	E4
C56	D2	D2	Q81	A4	E4	Q81	C4	E4
C57	B1	D2	Q83	A5	E5	Q83	C5	E5
C88	B1	E2	Q86	A5	F5	Q86	C5	F5
C95	C1	E2						
CR53	C1	D1	R01	B4	A4	R01	D4	A4
CR66	C1	D2	R02	B4	A4	R02	D4	A4
CR74	C1	D2	R11	B4	A4	R11	D4	A4
CR75	C1	D2	R12	B4	A4	R12	D4	A4
CR84	C1	E2	R14	B3	B5	R14	D3	B5
CR85	C1	E2	R16	B3	B5	R16	D3	B5
			R19	B3	B6	R19	D3	B6
L13	B2	B2	R23	A3	B5	R23	D3	B5
L21	B2	B1	R24	A3	B5	R24	C3	B5
L25	B2	B2	R25	A3	B5	R25	C3	B5
L48	D2	C2	R31	A3	C4	R31	C3	C4
L89	C1	E2	R37	A2	B5	R37	D2	B5
L98	C1	E3	R40	A3	C4	R40	C3	C4
Q58	B1	D2	R41	A3	C4	R41	C3	C4
R33	B2	C1	R42	A3	C4	R42	C3	C4
R43	D2	C2	R43	A3	C4	R43	C3	C4
R44	D2	C2	R60	A4	D4	R60	D4	D4
R45	C1	C2	R61	A4	D4	R61	C4	D4
R55	B1	D2	R62	B5	D4	R62	D5	D4
R58	B1	D2	R64	A4	D5	R64	C4	D5
R62	C1	G1	R72	A4	E4	R72	C4	E4
R66	B1	D2	R77	A5	E5	R77	C5	E5
R68	B1	D2	R83	A5	E5	R83	C5	E5
R72	C1	D1	R85	A5	E5	R85	C5	E5
R73	C1	D1	R86	B5	E5	R86	D5	E5
R75	C1	E2	R87	A5	E6	R87	C5	E6
R82	C1	E1	R88	A5	E6	R88	C5	E6
R83	C1	E1	R89	A5	E6	R89	C5	E6
R84	C1	E2	R90	A4	F4	R90	C4	F4
R94	C1	F1	R91	A4	F4	R91	C4	F4
T55	C1	D2	R92	A4	F4	R92	D4	F4
T65	C1	D2	R93	A4	F5	R93	C4	F5
T94	C1	F2	R95	A5	F5	R95	C5	F5
			R97	A5	F5	R97	C5	F5
			T09	B3	A6	T09	D3	A6
			T27	A3	B6	T27	C3	B6
			U14	A3	A5	U14	C3	A5
			VR94	A5	F5	VR94	C5	F5
<b>ASSY A28</b>			<b>ASSY A29</b>			<b>P/O ASSY A32</b>		
C05	B3	A5	C05	D3	A5	P90	A5	M1
C07	B3	A5	C07	D3	A5	P91	A5	M1
C17	B3	B5	C17	D3	B5	P94	D5	L1
C34	A3	C5	C34	C3	C5	P95	C5	L1
C41	A4	C4	C41	C4	C4	P96	C5	K1
C47	A4	C5	C47	C4	C5	P98	A2	J1
C51	A3	D4	C51	C3	D4	<b>Component locations for A32 are shown on the reverse side of the block diagram.</b>		
C57	A4	D5	C57	C4	D5			
C58	A5	D6	C58	C5	D6			
C59	B5	D6	C59	D5	D6			
C66	A4	D5	C66	C4	D5			
C76	A5	E5	C76	C5	E5			
C78	B5	E6	C78	D5	E6			
C86	A5	E5	C86	C5	E5			
C98	A5	F6	C98	D5	F6			
E83	A5	E5	E83	C5	E5			
L38	B2	C6	L38	D2	C6			
L44	A4	C5	L44	C4	C5			
L54	A4	C5	L54	C4	C5			
L64	A4	D5	L64	C4	D5			
L88	A5	E6	L88	C5	E6			
L89	A5	E6	L89	C5	E6			
LR14	A3	B5	LR14	C3	B5			
LR24	B3	B5	LR24	D3	B5			
P71	A5	E4	P71	C5	E4			





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A

WAVEFORMS

B

C

D

ZERO CARRIER DRIVE SWITCHING SIGNAL  
FROM A60 P60-5

CORES  
REMOVED

OUT QUAD

COMPONENT NUMBER EXAMPLE

Component Number  
A23 A2 R1234  
Assembly Number Subassembly Number (if used) Schematic Circuit Number

Chassis mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

Static Sensitive Devices  
See Maintenance Section

A27 IF ZERO CARRIER/PHASE SHIFTER BOARD

PART OF A32 IF INTERFACE BOARD

L.O. FROM  
A59 P93

W31

W32

W33

W34

W35

W36

W37

W38

W39

W40

W41

W42

W43

W44

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W46

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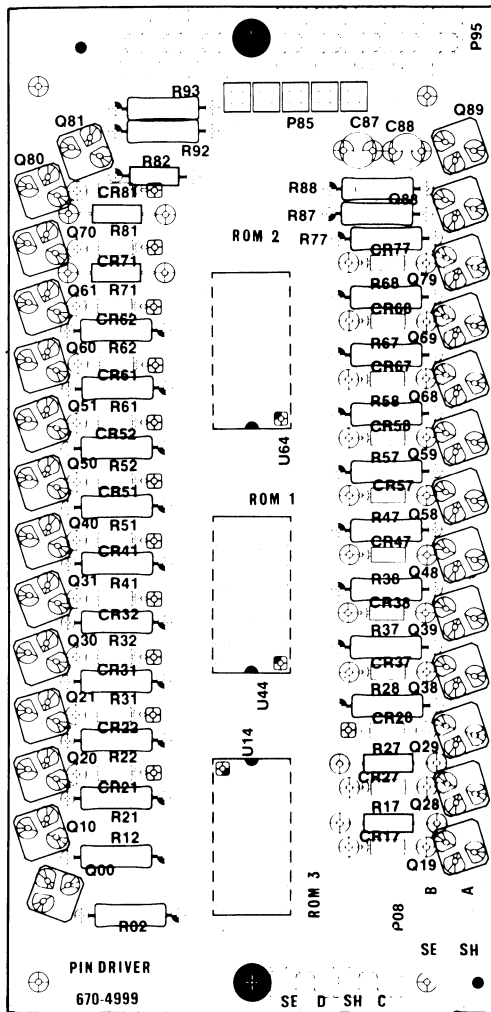
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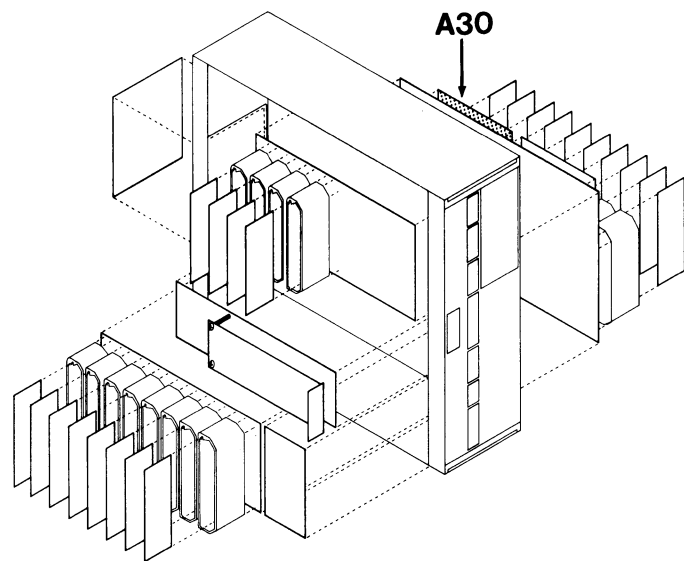
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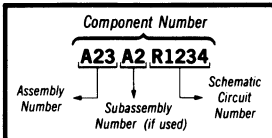
A30 PIN DRIVER BOARD



Pin Driver 5					
Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
ASSY A30			Q59	A4	C3
C87	A1	C1	Q60	D4	A2
C88	A1	C1	Q61	D5	A2
			Q68	A4	C3
CR17	A2	C5	Q69	A4	C2
CR21	D2	A5	Q70	D5	A2
CR22	D2	A4	Q79	A5	C2
CR27	A2	C5	Q80	D5	A2
CR28	A2	C4	Q81	A1	A1
CR31	D3	A4	Q88	A5	C2
CR32	D3	A4	Q89	A5	C1
CR37	A3	C4			
CR38	A3	C4	R02	D2	A5
CR41	D3	A4	R12	D2	A5
CR47	A3	C3	R17	A2	C5
CR51	D4	A3	R21	D2	A5
CR52	D4	A3	R22	D2	A5
CR57	A4	C3	R27	A2	C5
CR58	A4	C3	R28	A2	C4
CR61	D4	A3	R31	D3	A4
CR62	D5	A2	R32	D3	A4
CR67	A4	C3	R37	A3	C4
CR68	A4	C2	R38	A3	C4
CR71	D5	A2	R41	D3	A4
CR77	A5	C2	R47	A3	C3
CR81	D5	A2	R51	D4	A3
			R52	D4	A3
Q00	D2	A5	R57	A4	C3
Q10	D2	A5	R58	A4	C3
Q19	A2	C5	R61	D4	A3
Q20	D2	A5	R62	D4	A2
Q21	D2	A4	R67	A4	C2
Q28	A2	C5	R68	A4	C2
Q29	A2	C5	R71	D5	A2
Q30	D3	A4	R77	A5	C2
Q31	D3	A4	R81	D5	A2
Q38	A3	C4	R82	A1	A2
Q39	A3	C4	R87	A5	C2
Q40	D3	A3	R88	A5	C2
Q48	A3	C4	R92	A1	B1
Q50	D4	A3	R93	A1	B1
Q51	D4	A3			
Q58	A4	C3	U14	C1	B5
			U44	A1	B4
			U64	B1	B3

Static Sensitive Devices  
See Maintenance Section

COMPONENT NUMBER EXAMPLE



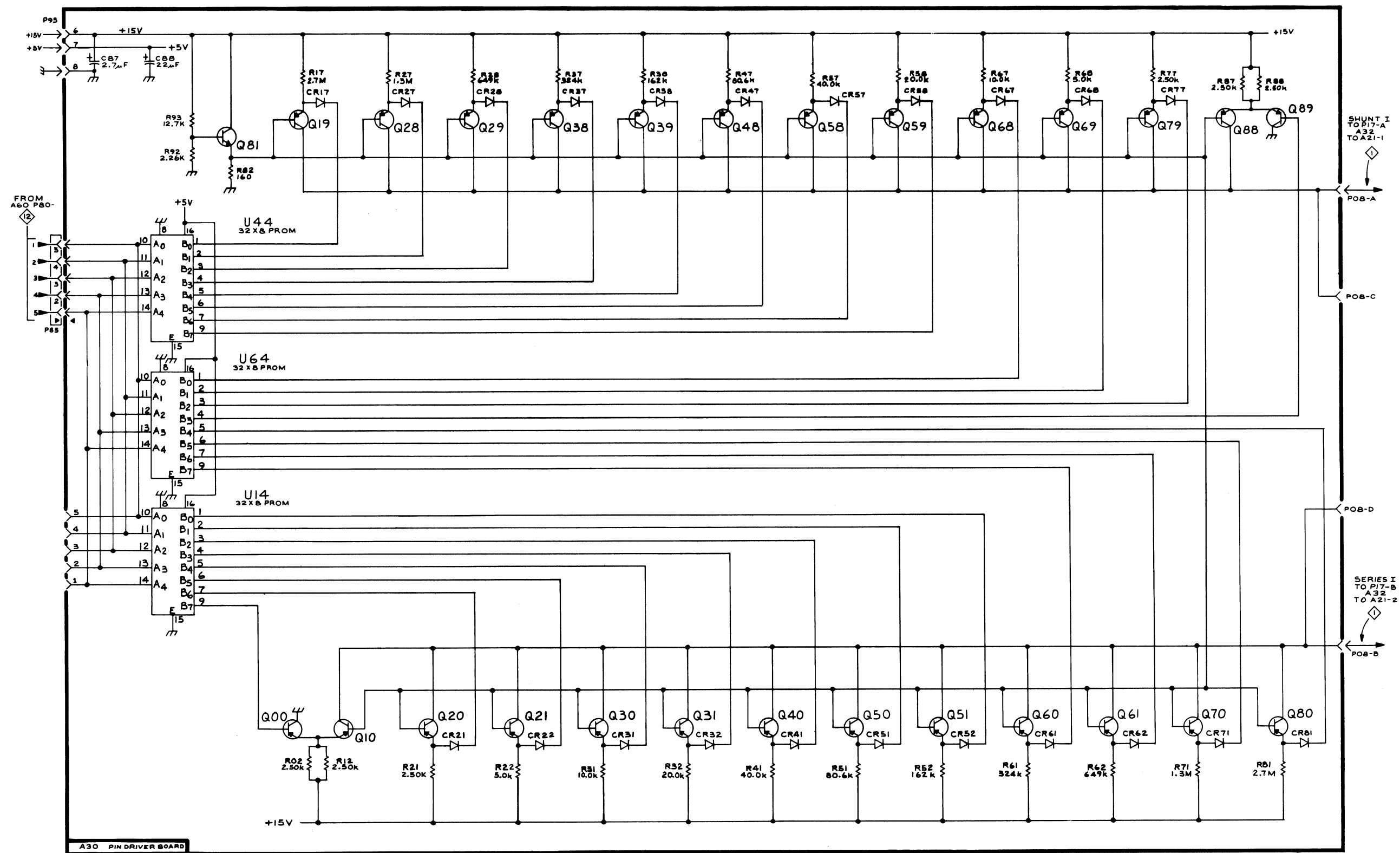
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

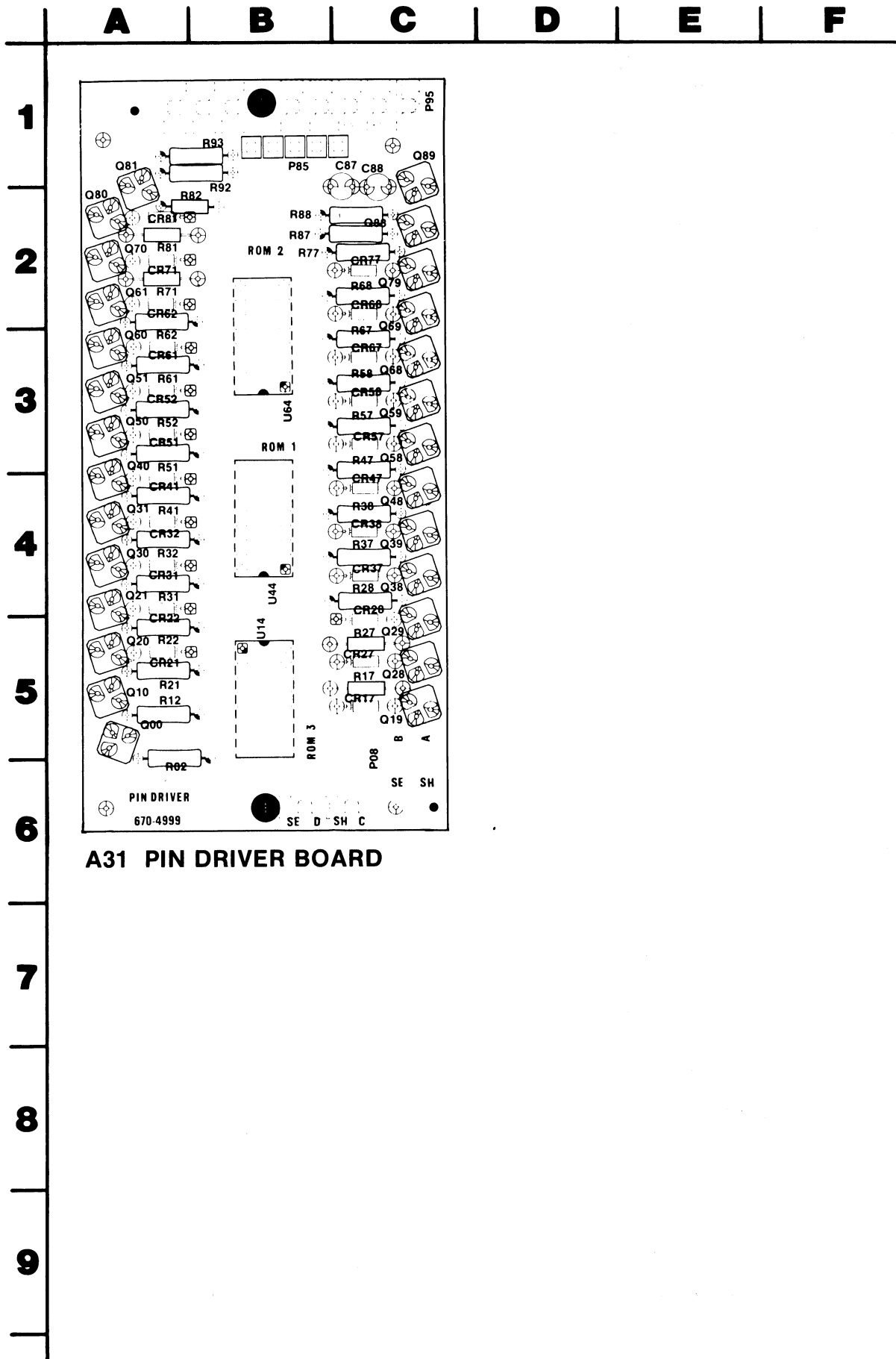
A

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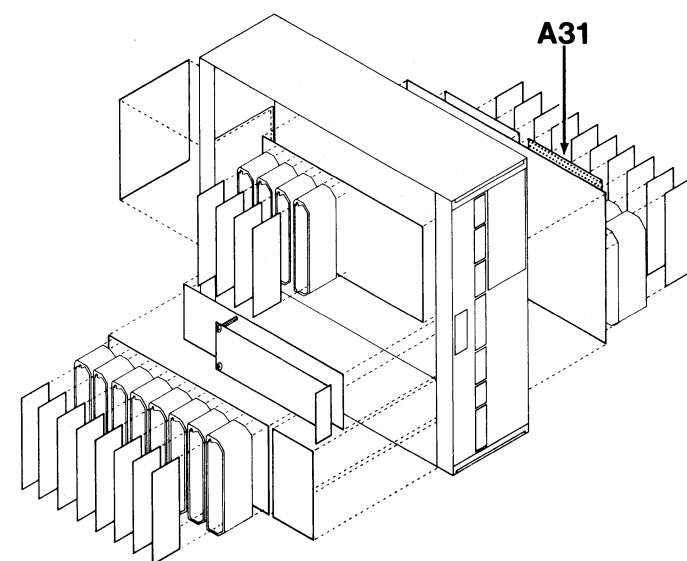
C

D





A31 PIN DRIVER BOARD



Pin Driver <span style="border: 1px solid black; padding: 0 2px;">5</span> <sub>A</sub>					
Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
<b>ASSY A31</b>			Q59	A4	C3
			Q60	D4	A3
			Q61	D5	A2
			Q68	A4	C3
			Q69	A4	C2
			Q70	D5	A2
			Q79	A5	C2
			Q80	D5	A2
			Q81	A1	A1
			Q88	A5	C2
			Q89	A5	C1
			R02	D2	A5
			R12	D2	A5
			R17	A2	C5
			R21	D2	A5
			R22	D2	A5
			R27	A2	C5
			R28	A2	C4
			R31	D3	A4
			R32	D3	A4
			R37	A3	C4
			R38	A3	C4
			R41	D3	A4
			R47	A3	C3
			R51	D4	A3
			R52	D4	A3
			R57	A4	C3
			R58	A4	C3
			R61	D4	A3
			R62	D4	A2
			R67	A4	C3
			R68	A4	C2
			R71	D5	A2
			R77	A5	C2
			R81	D5	A2
			R82	A1	A2
			R87	A5	C2
			R88	A5	C2
			R92	A1	B1
			R93	A1	B1
			U14	C1	B5
			U44	A1	B4
			U64	B1	B3

 Static Sensitive Devices  
See Maintenance Section

**COMPONENT NUMBER EXAMPLE**

Component Number

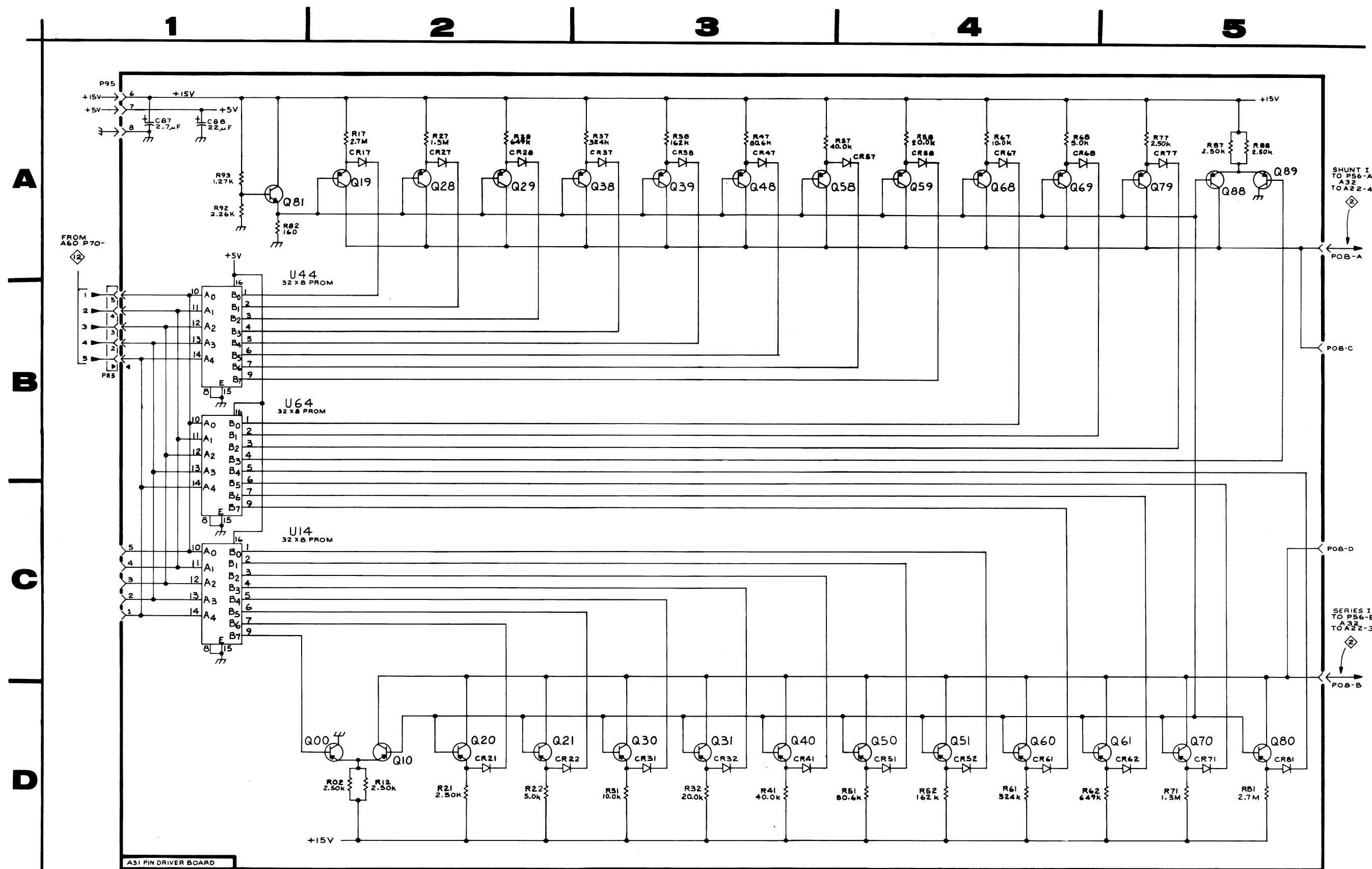
**A23 A2 R1234**

Assembly  
Number

Subassembly  
Number (if used)

Schematic  
Circuit  
Number

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.





A

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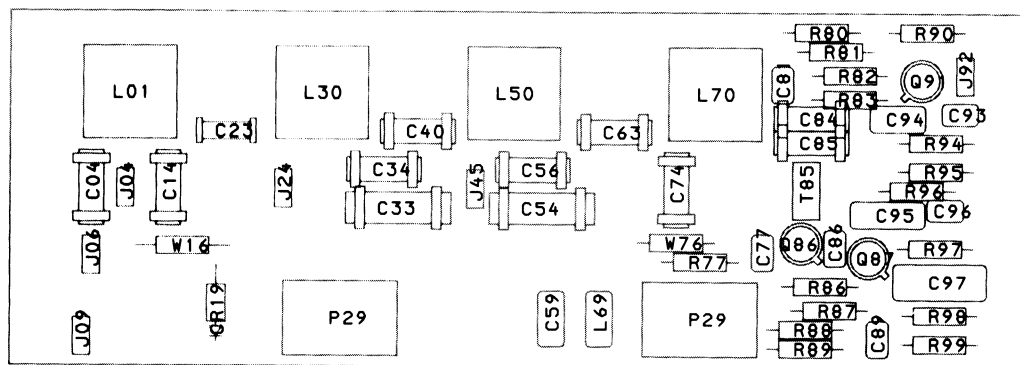
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A45 Q-P FILTER BOARD

A

B

C

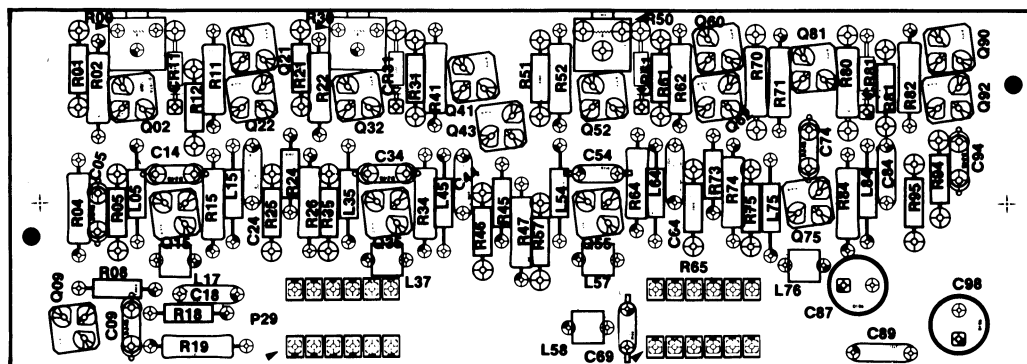
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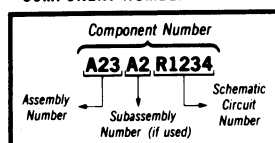
1

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A46 Q-P LIMITER BOARD

## COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

Static Sensitive Devices  
See Maintenance Section

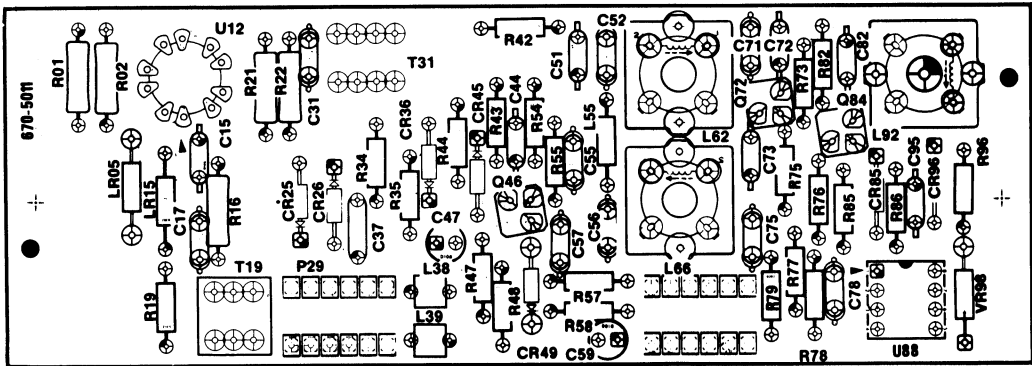
qp filter DIAGRAM <span>5</span> <sub>B</sub>								
ASSEMBLY A45								
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C4	E1	B2	C97	C3	F2	R80	C1	E1
C14	E2	B2				R81	C1	E1
C23	D1	B1	CR19	E1	B2	R82	C1	F1
C33	D2	C2				R83	D1	F1
C34	D2	C1	J4	E2	B2	R86	B2	E2
C40	D1	C1	J6	E2	B2	R87	B2	E2
C54	D2	D2	J9	B1	B2	R88	B2	E2
C56	C2	D1	J24	D2	C1	R89	B2	E2
C59	C2	D2	J45	D2	D1	R90	D1	F1
C59	C3	D2	J92	D1	F1	R94	C1	F1
C63	C1	D1				R95	B2	F1
C74	C2	E2	L1	E2	B1	R96	B2	F2
C77	C2	E2	L30	D2	C1	R97	C2	F2
C81	C1	E1	L50	C2	D1	R98	B2	F2
C84	C1	E1	L69	C2	D2	R99	C2	
C85	C2	E1	L69	C3	D2	R99	C3	F2
C86	B2	E2	L70	C2	E1			
C89	B2	F2				T85	B1	E2
C93	D1	F1	Q86	C2	E2			
C94	D1	F2	Q87	B2	F2	W16	E1	B2
C95	B3	F2	Q91	D1	F1	W76	C2	E2
C96	B2	F2						
C97	C2	F2	R77	C2	E2			
ASSEMBLY A46								
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C5	B3	A2	L76	F3	E2	R22	D5	B1
C9	B4	A2	L84	F4	E2	R24	C4	B2
C14	B3	B2				R25	C4	B2
C18	C5	B2	Q2	C5	A2	R26	C4	B2
C24	C4	B2	Q9	B3	A2	R30	D5	B1
C34	D3	C2	Q15	B3	B2	R31	D4	C1
C44	D4	C2	Q21	C5	B1	R34	D4	C2
C54	E3	D2	Q22	C4	B1	R35	C4	B2
C64	F4	D2	Q32	D5	C1	R41	D5	C1
C69	G3	D2	Q35	D4	C2	R45	D4	C2
C74	F3	E1	Q41	D5	C1	R46	D4	C2
C84	G4	E2	Q43	D4	C1	R47	D4	C2
C87	G3	E2	Q52	E5	D1	R50	E5	D1
C89	G5	E2	Q55	E4	D2	R51	E5	C1
C94	G4	F1	Q60	F5	D1	R52	E5	D1
C98	G5	F2	Q62	F4	D1	R57	E4	C2
			Q75	F4	E2	R61	E4	D1
CR11	B44	B1	Q81	G5	E1	R62	F5	D1
CR31	D5	C1	Q90	G5	F1	R64	E4	D2
CR61	E5	D1	Q92	G4	F1	R65	F4	D2
CR81	F5	E1				R70	F5	E1
			R	B4	A1	R71	G5	E1
L5	B3	A2	R1	B4	A1	R73	F4	D2
L15	B3	B2	R2	C5	A1	R74	F4	D2
L17	B3	B2	R4	B3	A2	R75	F4	E2
L35	C3	B2	R5	B3	A2	R80	F5	E1
L37	C3	C2	R8	B3	A2	R81	G4	E1
L45	D4	C2	R11	C5	B1	R82	G5	E1
L54	D3	D2	R12	C4	B1	R84	F4	E2
L57	E3	D2	R15	B3	B2	R94	G4	F2
L58	G3	D2	R18	B4	B2	R95	G4	E2
L64	E4	D2	R19	B3	B2			
L75	F3	E2	R21	D5	B1			
ASSEMBLY A44								
LOOK-UP FOR PARTS ON <span>5</span> <sub>B</sub>			COMPONENT LOCATIONS FOR A44 ARE SHOWN ON THE REVERSE SIDE OF <span>6</span>					



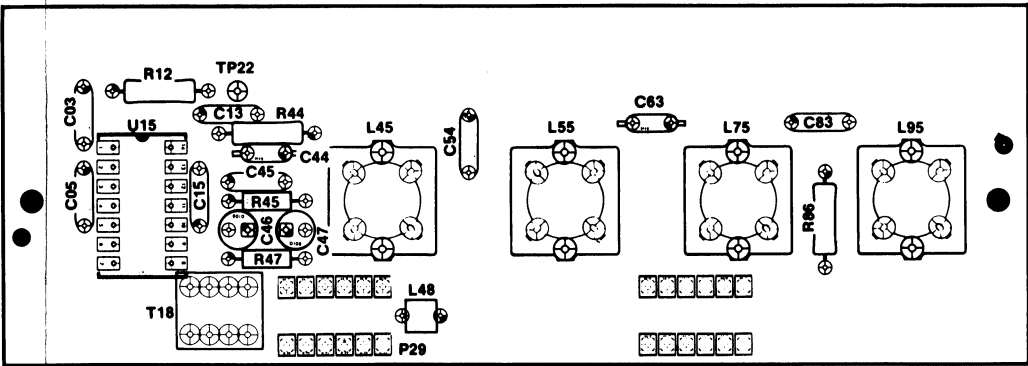
COMPONENT LOCATIONS  
A40, A41, A42, A44

A B C D E F G H I J K L

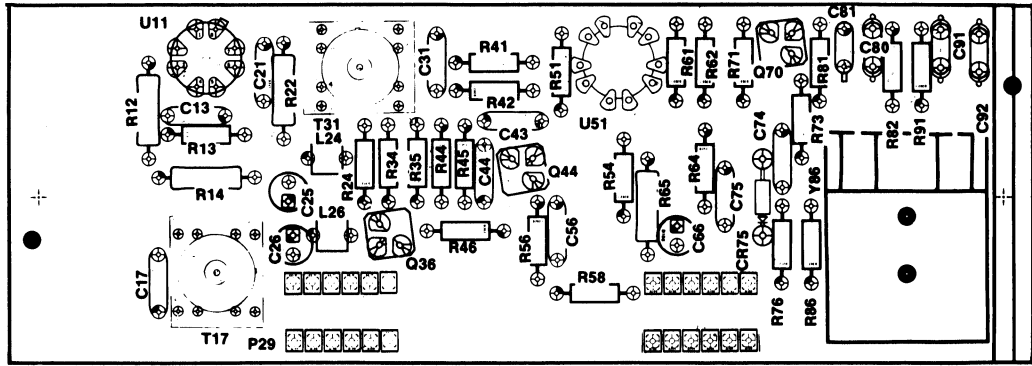
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A40 1st AUDIO MIXER BOARD



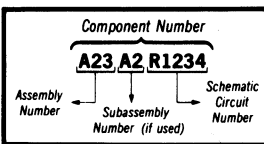
A42 AUDIO LIMITER BOARD



A41 2nd AUDIO MIXER BOARD

Static Sensitive Devices  
See Maintenance Section

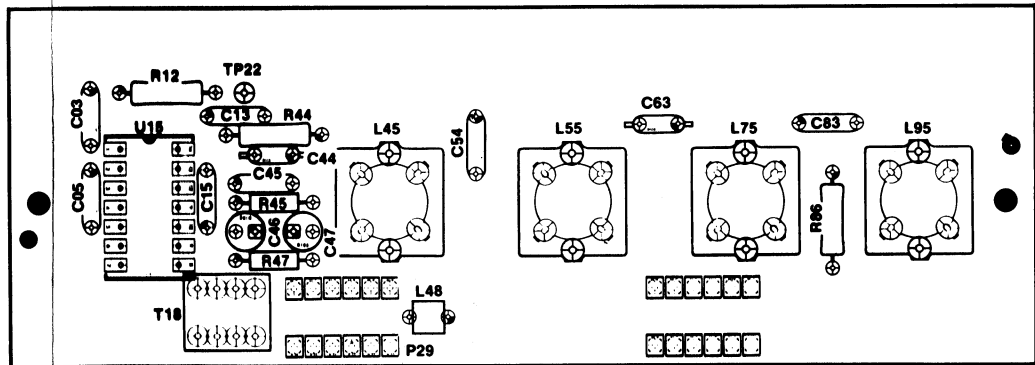
COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

Circuit Number	Schematic Location	Board Location
ASSY A40		
C15	C2	B1
C17	C1	B2
C31	C1	B1
C37	B1	C2
C44	B1	C1
C47	A1	C2
C51	D2	D1
C52	D1	D1
C55	B1	D1
C56	D1	D2
C57	A1	D2
C59	A1	D2
C71	D1	E1
C72	D2	E1
C73	D2	E1
C75	D1	E2
C78	D2	E2
C82	D2	E1
C95	D3	E2
CR25	B2	B2
CR26	B2	B2
CR36	B2	C1
CR45	B2	C1
CR49	A1	C2
CR85	D3	E2
CR96	D2	F2
L38	A1	C2
L39	A1	C2
L55	D1	D1
L62	D1	D1
L66	D1	D2
L92	D2	E1
LR05	C1	A2
LR15	C1	B2
LR19	C1	B2
Q46	A1	C2
Q72	D2	E1
Q84	D2	E1
R01	C1	A1
R02	C1	A1
R16	C1	B2
R21	C1	B1
R22	C1	B1
R34	B2	C2
R35	B1	C2
R42	D2	C1
R43	B1	C1
R44	B2	C1
R47	B1	C2
R48	A1	C2
R54	A1	D1

G H I J K L



A42 AUDIO LIMITER BOARD

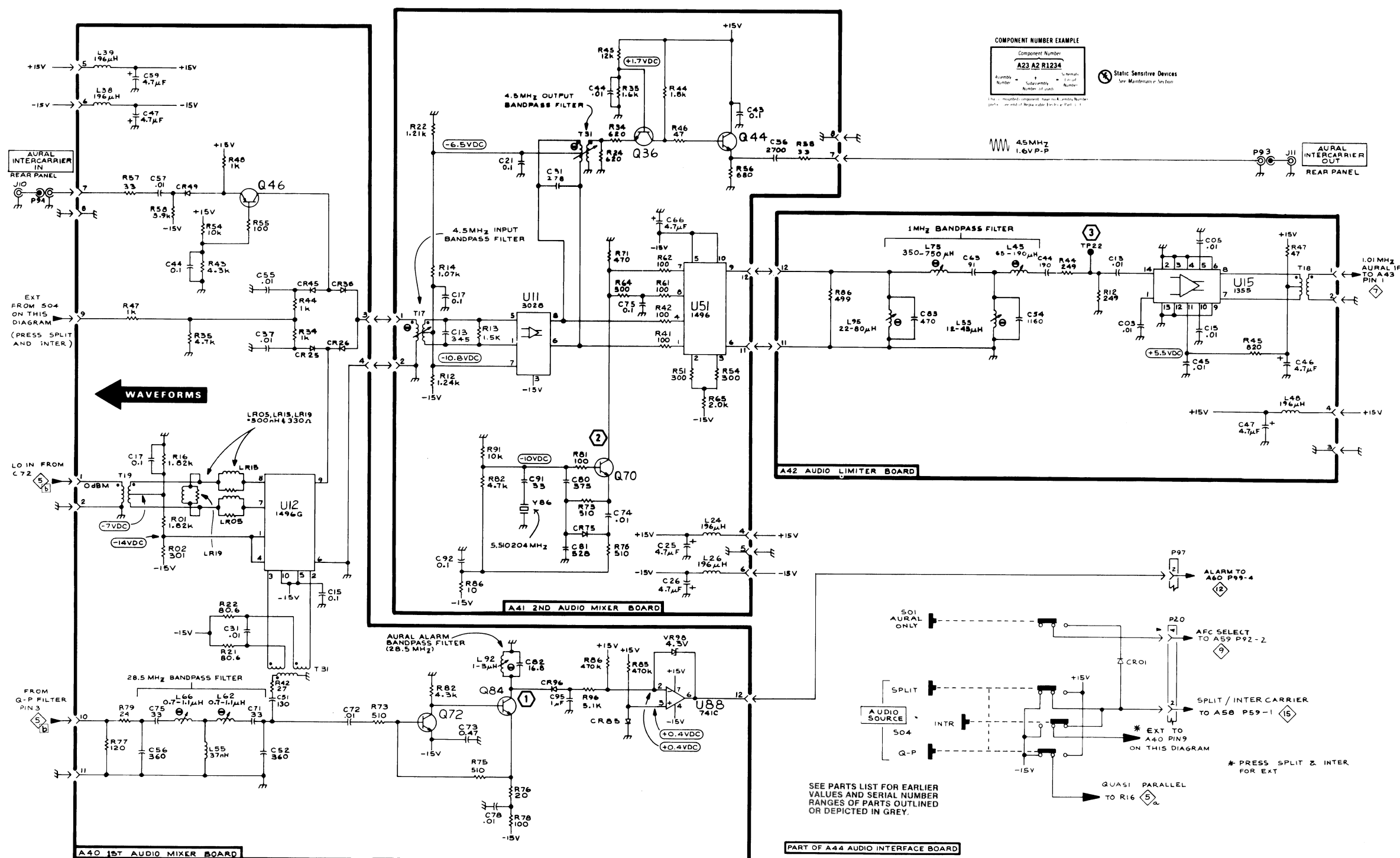
Audio Input Board 6								
Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
ASSY A40			R55	A1	D2	R45	A3	C8
C15	C2	B1	R57	A1	D2	R46	A3	C8
C17	C1	B2	R58	A1	D2	R51	B3	D7
C31	C1	B1	R73	D2	E1	R54	B3	D8
C37	B1	C2	R75	D2	E2	R56	A3	C8
C44	B1	C1	R76	D2	E2	R58	A3	D8
C47	A1	C2	R77	D1	E2	R61	B3	D7
C51	D2	D1	R78	D2	E2	R62	B3	D7
C52	D1	D1	R79	D1	E2	R64	B3	D8
C55	B1	D1	R82	D2	E1	R65	B3	D8
C56	D1	D2	R85	D3	E2	R71	B3	E7
C57	A1	D2	R86	D3	E2	R73	C3	E8
C59	A1	D2	R96	D3	F2	R76	C3	E8
C71	D1	E1	T19	C1	B2	R81	C3	E7
C72	D2	E1	T31	D2	C1	R82	C2	E8
C73	D2	E1	U12	C2	B1	R86	C2	E8
C75	D1	E2	U88	D3	E2	R91	C2	F8
C78	D2	E1	VR98	D3	F2	T17	B2	B9
C82	D2	E1				T31	B2	C7
C95	D3	E2				U11	B2	B7
CR25	B2	B2				U51	B3	D7
CR26	B2	B2				Y86	C2	E8
CR36	B2	C1	ASSY A41			ASSY A42		
CR45	B2	C1	C13	B2	B8	C03	B5	G1
CR49	A1	C2	C17	B2	B8	C05	B5	G2
CR85	D3	E2	C21	A2	B7	C13	B5	H1
CR96	D2	F2	C25	C3	B8	C15	B5	H2
L38	A1	C2	C26	C3	B8	C44	B4	H1
L39	A1	C2	C31	A3	C7	C45	B5	H2
L55	D1	D1	C43	A3	C8	C46	B5	H2
L62	D1	D1	C44	A3	C8	C47	B5	I2
L66	D1	D2	C56	A3	D8	C54	B4	I1
L92	D2	E1	C66	A3	D8	C63	B4	J1
LR05	C1	A2	C74	C3	E8	C83	B4	K1
LR15	C1	B2	C75	B3	E8	L45	B4	I1
LR19	C1	B2	C80	C3	E7	L48	B5	I2
Q46	A1	C2	C81	C3	E7	L55	B4	J1
Q72	D2	E1	C91	C2	F7	L75	B4	K1
Q84	D2	E1	C92	C2	F7	L95	B4	L1
R01	C1	A1	CR75	C3	E8	R12	B5	H1
R02	C1	A1	L24	C3	B8	R44	B4	H1
R16	C1	B2	L26	C3	B8	R45	B5	H2
R21	C1	B1	Q36	A3	C8	R47	B5	H2
R22	C1	B1	Q44	A3	D8	R86	B4	K2
R34	B2	C2	Q70	C3	E7	T18	B5	H1
R35	B1	C2	R12	B2	A8	TP22	B4	H1
R42	D2	C1	R13	B2	B8	U15	B5	H1
R43	B1	C1	R14	B2	B8			
R44	B2	C1	R22	A2	B7	ASSY A44		
R47	B1	C2	R24	A3	C8	S01		
R48	A1	C2	R34	A3	C8	S04		
R54	A1	D1	R35	A3	C8	COMPONENT LOCATIONS FOR A44 ARE SHOWN ON THE REVERSE SIDE OF 6		
			R41	B3	C7			
			R42	B3	C7			
			R44	A3	C8			

# A

**B**

C

# D



A

B

C

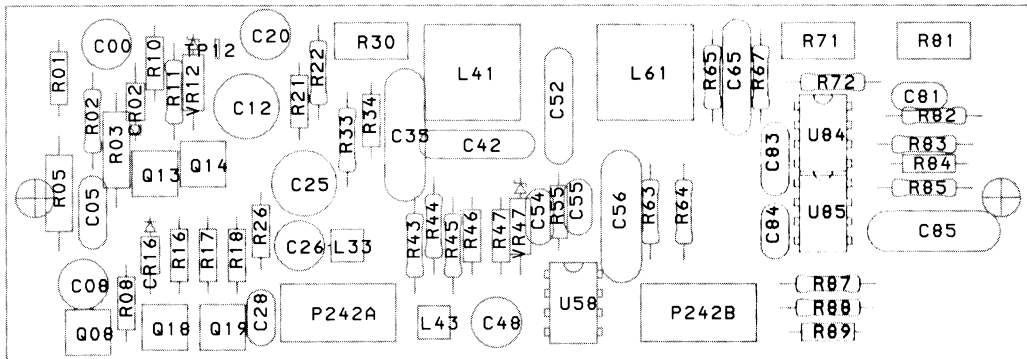
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A43 AUDIO DISCRIMINATOR BOARD

G

H

J

K

L

M

N

See Q-P FILTER DIAGRAM 5<sub>B</sub>

ASSEMBLY A44

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C17	G2	C7	CR90	H1	N5	R84	H2	K7
C55	H3	D7	CR91	H2	N5	R85	H3	L7
C72	H2	J5	CR92	H1	N5	R86	H2	L8
C73	G2	J6				R87	H3	L8
C86	G2	K8	L74	G2	J7	R90	H1	N5
C92	G2	N6				R92	H1	N5
			P45	A2	M6	R93	H1	N6
CR72	H2	J5	P46	A5	L8	R94	H2	N6
CR84	H2	K7	P91	H1	N5			
CR85	H2	K7	P95	A2	N7			
CR86	H3	K7				S4C	G1	B6
CR88	H3	K9	R16	G2	C7			

1

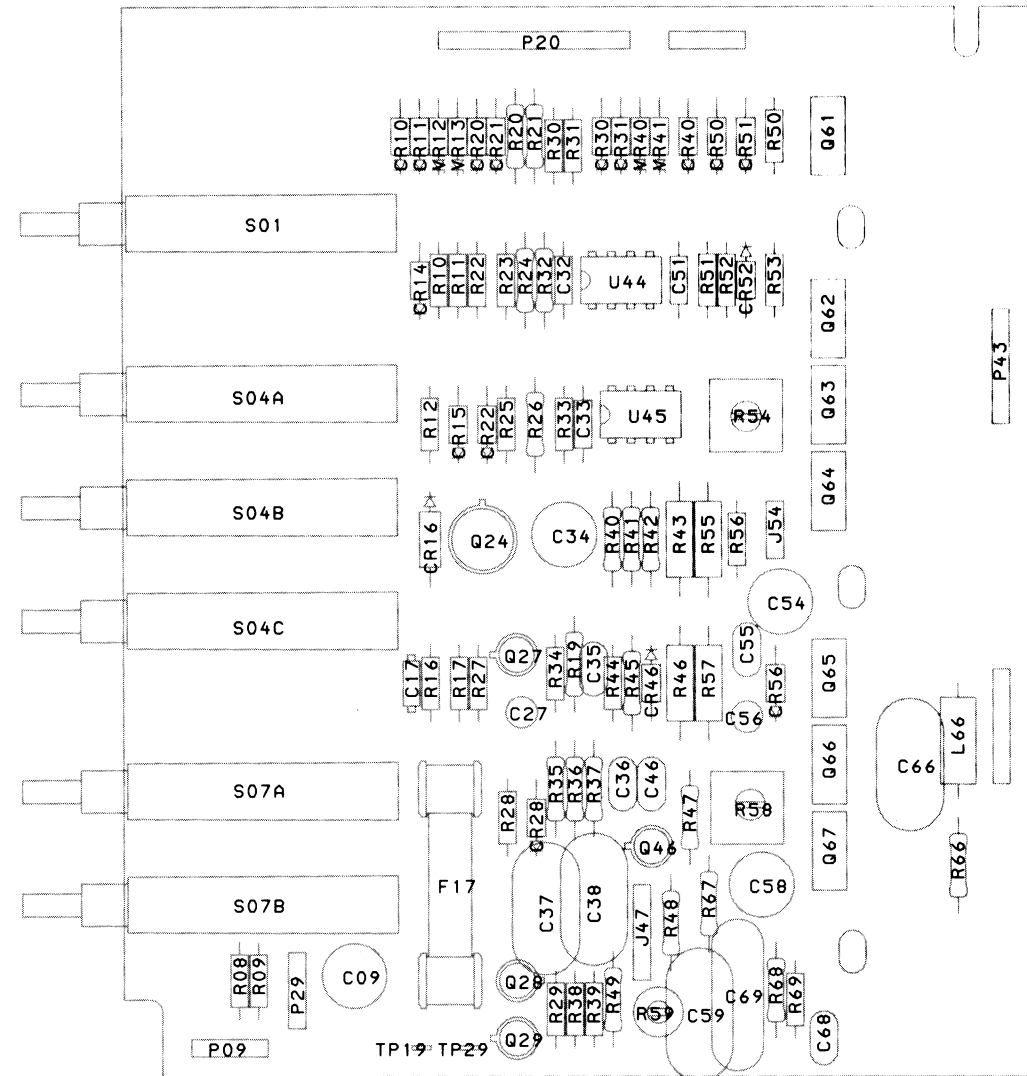
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6



A44 INTERFACE BOARD

P42

P41

CR72

CR73

L74

P40

CR84

CR85

CR86

CR87

CR88

P46

P45

CR90

CR91

CR92

CR93

CR94

CR95

CR96

CR97

CR98

CR99

R90

R91

R92

R93

R94

R95

R96

R97

R98

R99

# AUDIO OUTPUT DIAGRAM

7

## ASSEMBLY A43

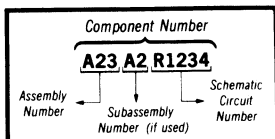
CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C	B1	A1	Q8	B2	A2	R65	C1	E1
C5	B2	A2	Q13	B2	A2	R65	D1	E1
C8	A1	A2	Q14	B2	B2	R67	C1	E1
C12	A1	B1	Q18	A2	B2	R71	D1	E1
C20	B2	B1	Q19	A2	B2	R72	C1	E1
C25	B2	B2				R81	D1	F1
C26	A3	B2	R1	B1	A1	R82	B1	F1
C28	A2	B2	R2	B2	A1	R83	B1	F1
C35	B2	C1	R3	A1	A1	R84	C1	F2
C42	C2	C1	R5	B2	A2	R85	C2	F2
C48	A3	C2	R8	A2	A2	R87	D1	E2
C54	C3	D2	R10	B1	A1	R88	D1	E2
C55	C3	D2	R11	B1	B1	R89	C2	E2
C56	C2	D2	R16	A2	B2			
C85	C1	E1	R17	A2	B2	TP12	B2	B1
C81	C1	F1	R18	A2	B2			
C83	C1	E2	R21	B2	B1	U58	C3	D2
C84	C2	E2	R22	B2	B1	U84A	C1	E1
C85	B1	F2	R26	A2	B2	U84B	D1	E1
			R30	B3	C1	U85A	D1	E2
CR2	A1	A1	R33	B3	C1	U85B	C2	E2
CR16	A2	A2	R34	B3	C1			
			R43	B2	C2	VR12	A1	B1
L33	A3	C2	R44	B3	C2	VR47	C3	C2
L41	C2	C1	R45	B3	C2			
L43	A3	C2	R46	B3	C2	W64	D1	D2
L61	C2	D1	R47	B3	C2			
			R55	C3	D2			
P65	D1	E2	R63	C2	D2			

## ASSEMBLY A44

CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION	CIRCUIT NUMBER	SCHEM LOCATION	BOARD LOCATION
C9	F1	B5	P9	H2	B5	R36	G2	C8
C27	F2	C8	P20	H2	C4	R37	G3	D8
C32	F3	C5	P20	H3	C4	R38	F1	C9
C33	F3	D6	P29	G1	B5	R39	E1	D9
C34	G2	C7	P30	D4	D4	R40	G2	D7
C35	G1	D7	P43	D3	F6	R41	G2	D7
C36	G3	D8	P92	C4	N5	R42	F4	D7
C37	F2	C9	P97	F1	N8	R43	H2	D7
C38	F2	D9				R44	G1	D7
C46	H3	D8	Q24	G2	C7	R45	G1	D7
C51	F3	D5	Q27	G1	C7	R46	H3	D7
C54	E2	D7	Q28	F1	C9	R47	G2	D8
C55	H1	D7	Q29	F1	C9	R48	E2	D9
C56	G2	D8	Q46	G2	D8	R49	F2	D9
C58	D1	D9	Q61	G4	E5	R50	G4	D5
C59	E2	D9	Q62	G5	E6	R51	G4	D5
C66	D2	E8	Q63	G4	E6	R52	G5	D5
C68	E2	E9	Q64	G3	E6	R53	G5	D5
C69	E2	D9	Q65	H1	E7	R54	E2	D6
			Q66	G2	E8	R55	H1	D7
			Q67	H2	E8	R56	E2	D7
CR11	G3	C5				R56	E2	D7
CR14	G4	C5	R8	H2	B5	R57	H1	D7
CR15	G3	C6	R9	H2	B5	R58	G2	D8
CR16	G2	C7	R10	G3	C5	R59	E2	D9
CR20	G3	C5	R11	G3	C5	R66	E2	E8
CR20	H3	C5	R12	G4	C6	R67	E2	D9
CR21	H3	C5	R17	G2	C7	R68	D1	D9
CR22	G3	C6	R19	E2	C7	R69	D1	E9
CR28	G3	C8	R20	H3	C5	R99	E1	N9
CR30	G4	D5	R21	H4	C5			
CR31	H4	D5	R22	G3	C5	TP19	H2	C9
CR40	G4	D5	R23	G3	C5	TP29	F1	C9
CR46	H2	D7	R24	F4	C5			
CR50	G5	D5	R25	G3	C6	U44A	F3	D5
CR51	G4	D5	R26	F3	C6	U44B	F5	D5
CR52	G5	D5	R27	G2	C7	U45A	F4	D6
CR56	H1	D7	R28	F2	C8	U45B	E1	D6
			R29	F2	C9			
F17	H2	C8	R30	G4	C5	VR12	G3	C5
J47	E1	D9	R31	G5	C5	VR13	G3	C5
J54	E2	D7	R32	G5	C5	VR40	G4	D5
			R33	F3	C6	VR41	G5	D5
			R34	G1	C7			
L66	D2	E8	R35	G3	C8			

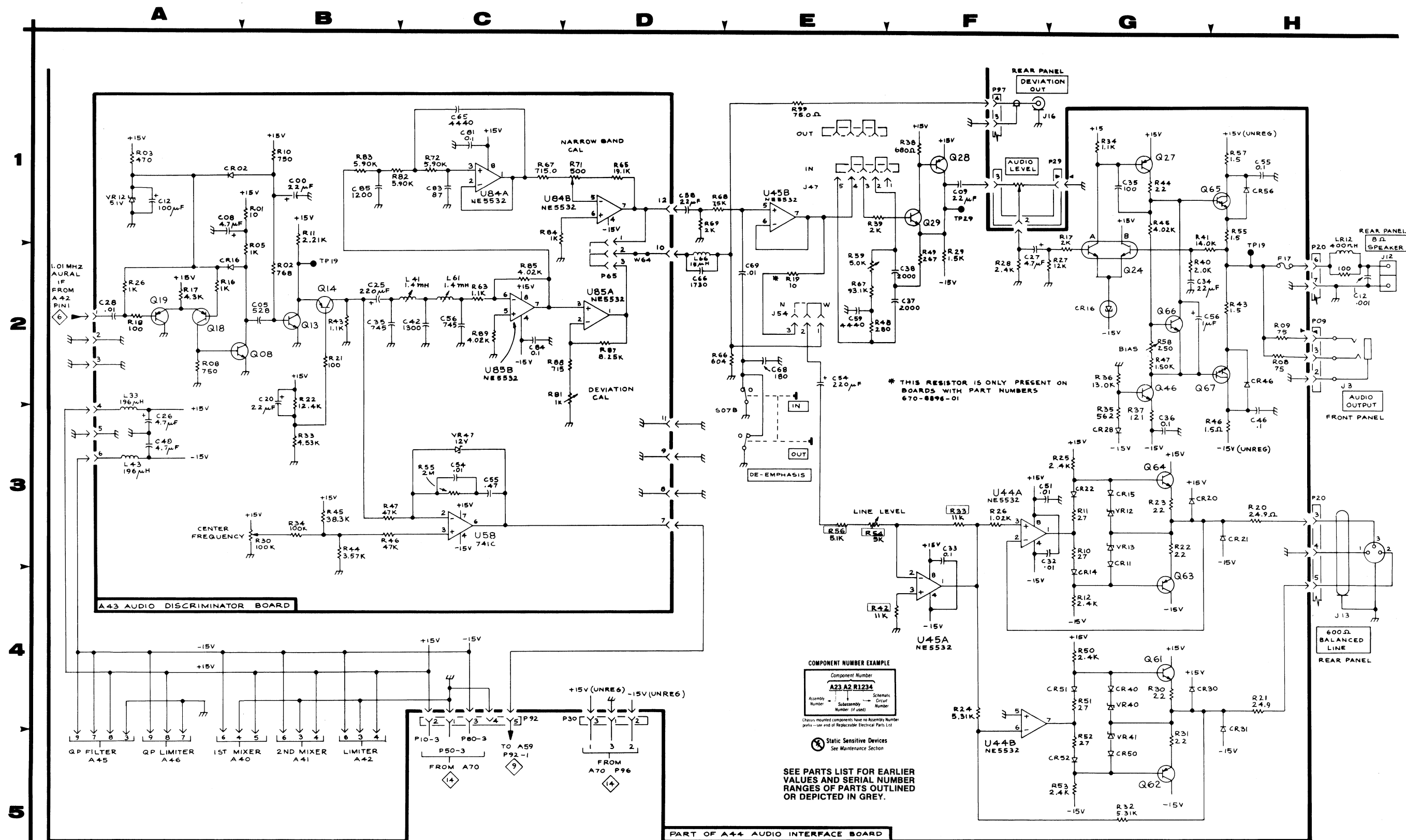
Static Sensitive Devices  
See Maintenance Section

### COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List





1450-1

5568-03  
REV AUG 1988

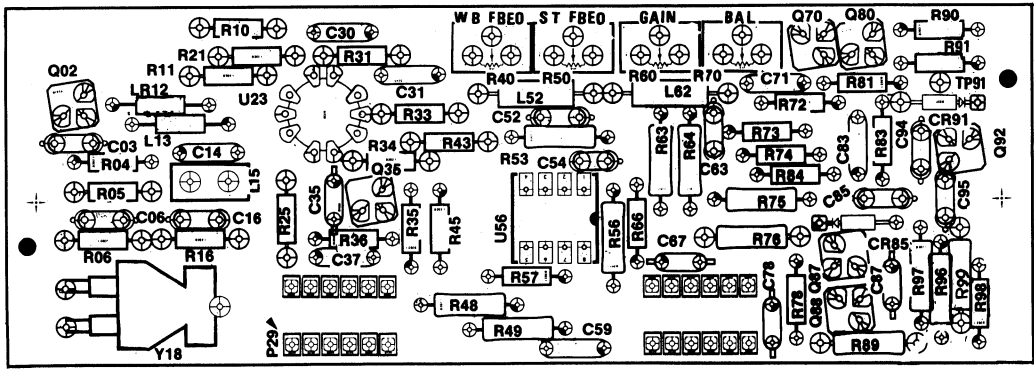
AUDIO OUTPUT 7

A43, A44  
AUDIO OUTPUT

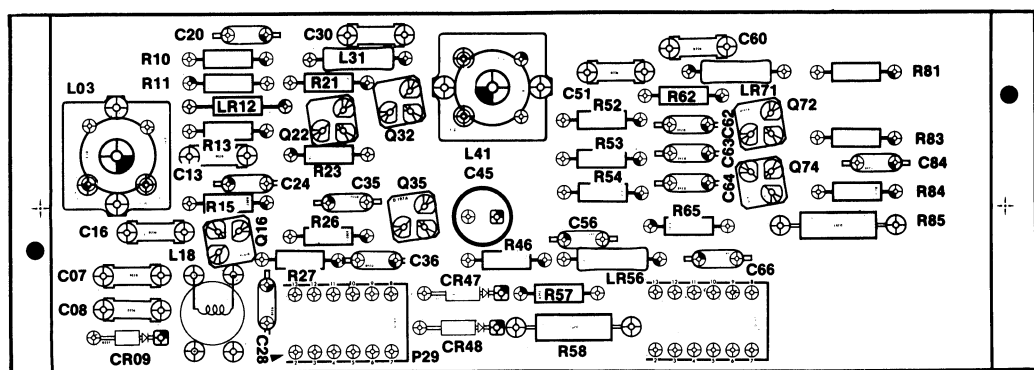
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A B C D E F G H I J K L M N

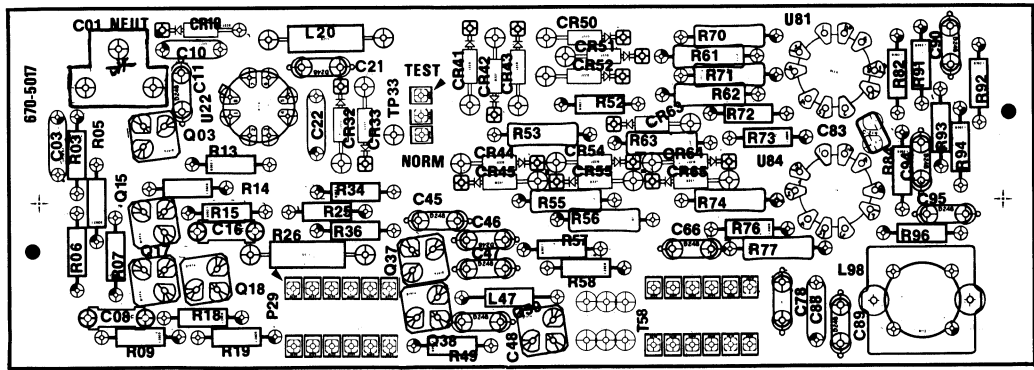
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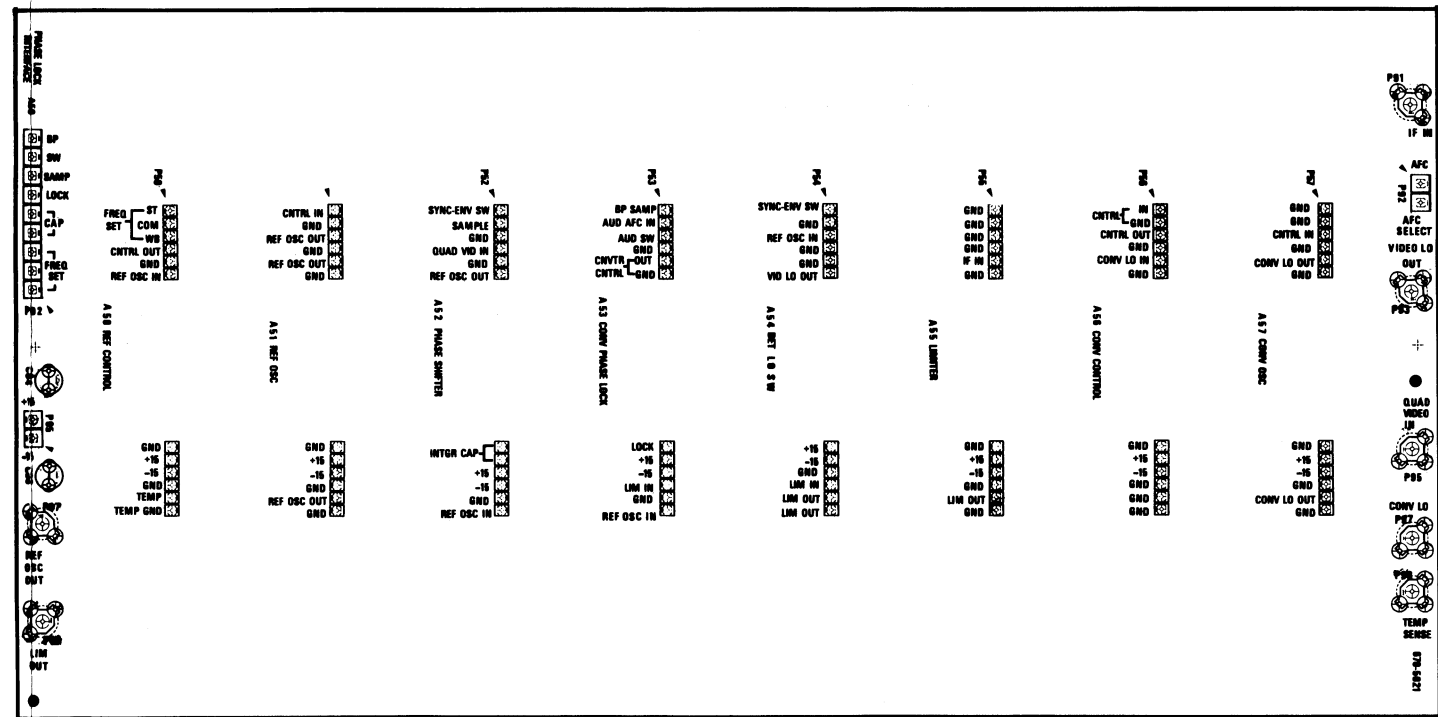
A50 REFERENCE CONTROL BOARD



A51 REFERENCE OSCILLATOR BOARD

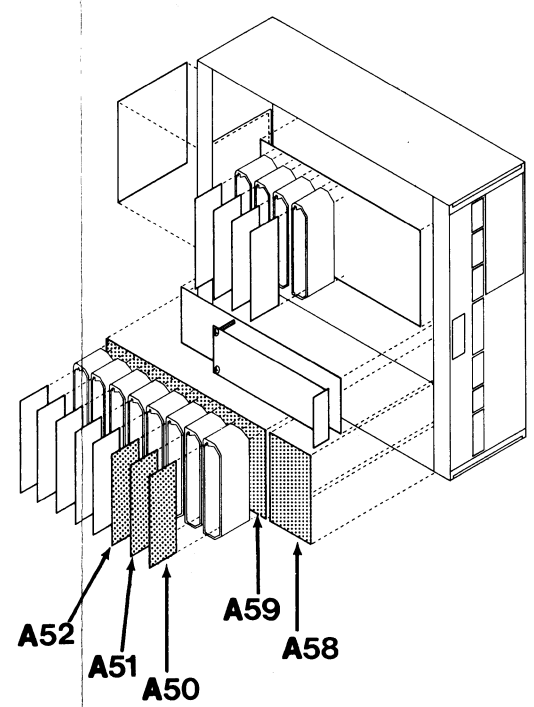


A52 PHASE SHIFTER BOARD



A59 PHASE LOCK INTERFACE BOARD

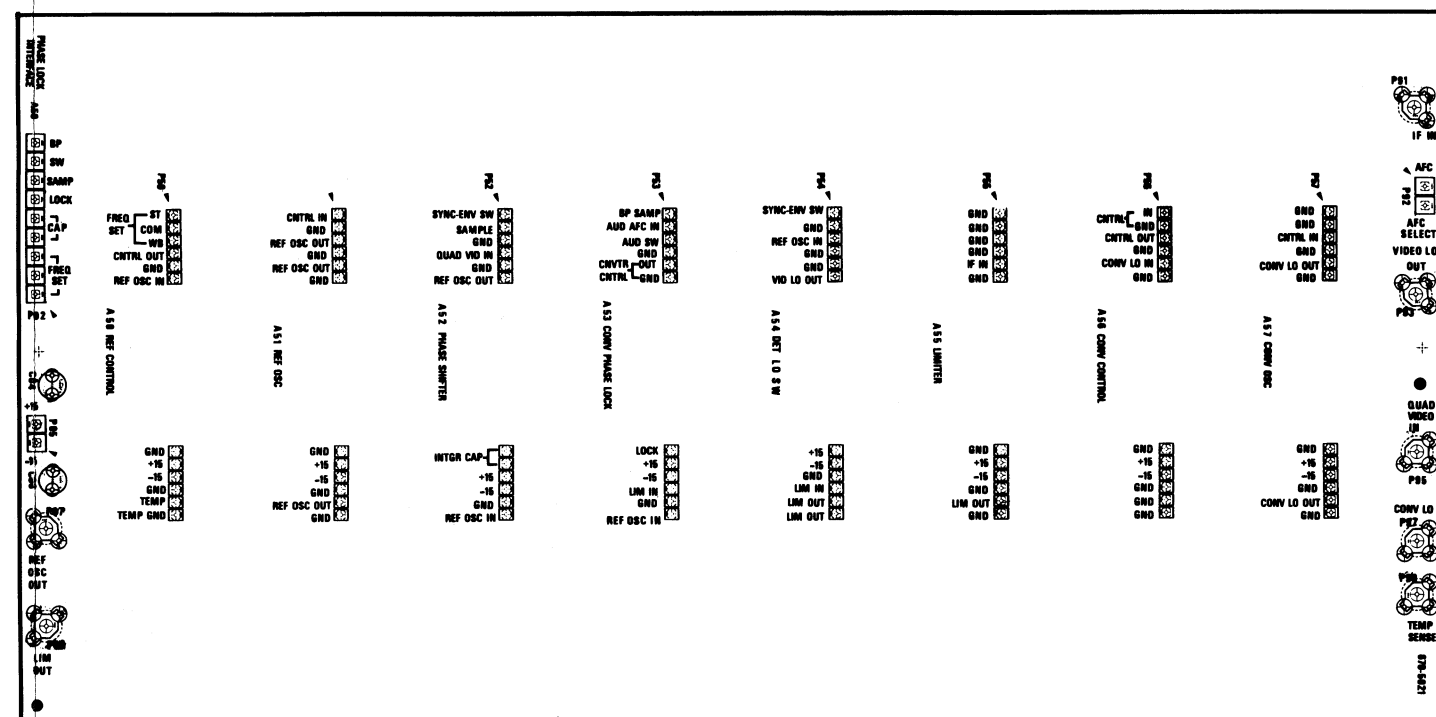
C55, C56, C57  
(On back of board)



Intermediate Frequency Reference & Phase Shifter 8					
Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
ASSY A50			Q80	A3	E1
C03	A2	A2	Q87	A3	E3
C06	A2	A2	Q88	B3	E3
C14	A1	B2	Q92	B3	F2
C16	A2	B2	R04	A2	A2
C30	B2	B1	R05	A2	A2
C31	A2	C1	R06	A1	A2
C35	B2	B2	R10	A2	B1
C37	B2	B2	R11	A2	A2
C52	B2	C2	R16	A1	B2
C54	B3	D2	R21	A2	B1
C59	B3	D3	R25	A2	B2
C63	B2	D2	R31	A2	B1
C67	A3	D2	R33	B2	C2
C71	A2	E1	R34	B2	C2
C78	B3	E3	R35	B2	C2
C83	A3	E2	R36	B2	B2
C85	A3	E2	R40	B2	C1
C87	A3	E3	R43	B2	C2
C94	B3	E2	R45	B2	C2
C95	A3	F2	R48	B3	C3
CR85	A3	E2	R49	B3	C3
CR91	A3	F2	R50	B2	D1
L13	A2	A2	R53	B3	C2
L15	A1	B2	R56	B3	D2
L52	A2	C2	R57	B3	C3
L62	A2	D1	R60	B3	D1
LR12	A2	A2	R63	B3	D2
Q02	A2	A1	R64	B3	D2
Q35	B2	C2	R66	B2	D2
Q70	A3	E1	R70	B2	D1
			R72	A3	E2
			R73	A3	E2
			R74	A3	E2
			R75	B2	E2
			R76	B3	E2

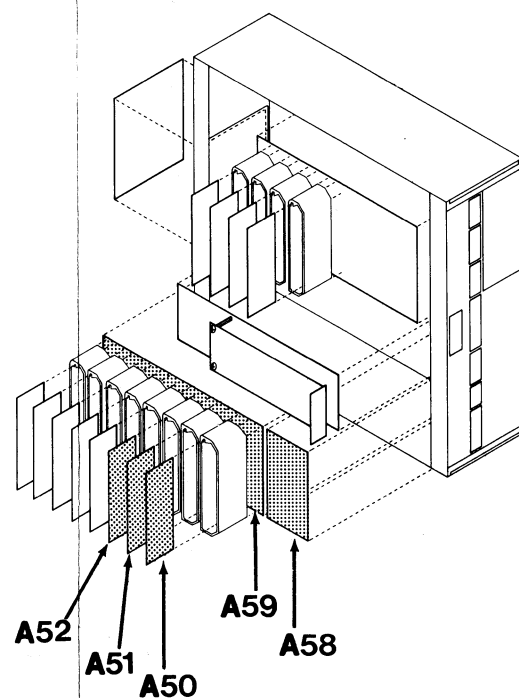
Circuit Number	Schematic Location
R78	A
R81	A
R83	A
R84	E
R89	A
R90	A
R91	A
R96	E
R97	A
R98	A
R99	A
TP91	A
U23	A
U56A	E
U56B	E
Y18	A
ASSY A51	
C07	A
C08	A
C13	B
C16	B
C20	B
C24	B
C28	B
C30	A
C35	A
C36	A
C45	B
C51	B
C56	A
C60	A
C62	A
C63	B
C64	B
C66	B
C84	A
CR09	A
CR47	B
CR48	B
L03	A
L18	A
L31	A
L41	A
LR12	A
LR56	B
LR71	B
Q16	B
Q22	A
Q32	A
Q35	B
Q72	A
Q74	A
R10	A
R11	A
R13	B
R15	B
R21	A
R23	B
R26	B
R27	A
R46	B
R52	B
R53	B
R54	B
R57	B
R58	B
R65	A
R81	A
R83	A
R84	A
R85	A

G H I J K L M N



A59 PHASE LOCK INTERFACE BOARD

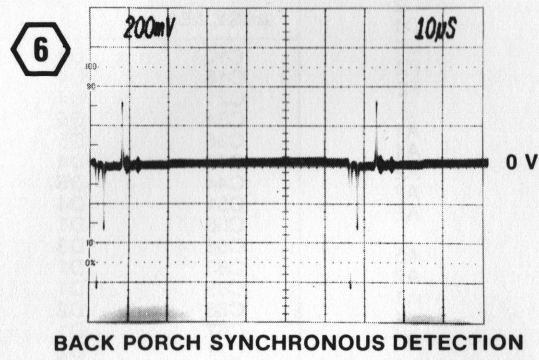
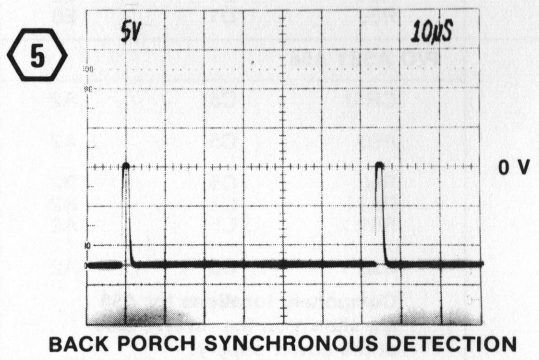
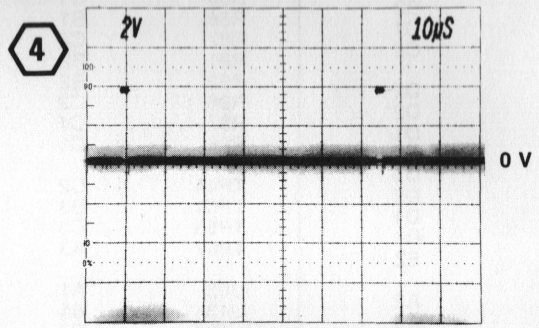
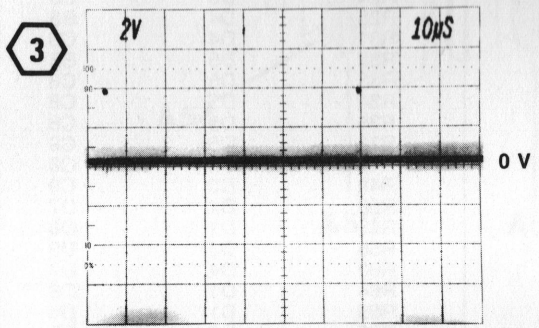
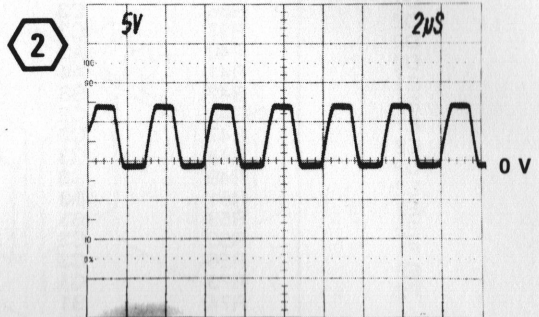
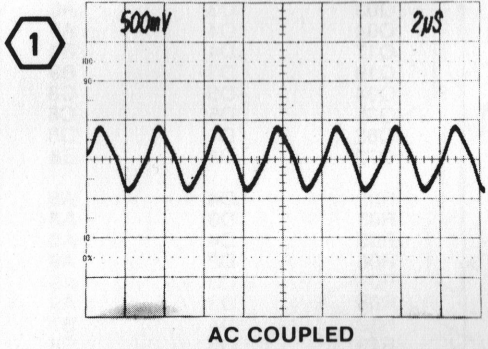
C55, C56, C57  
(On back of board)



Intermediate Frequency Reference & Phase Shifter 8					
Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
ASSY A50			Q80	A3	E1
C03	A2	A2	Q87	A3	E3
C06	A2	A2	Q88	B3	E3
C14	A1	B2	Q92	B3	F2
C16	A2	B2	R04	A2	A2
C30	B2	B1	R05	A2	A2
C31	A2	C1	R06	A1	A2
C35	B2	B2	R10	A2	B1
C37	B2	B2	R11	A2	A2
C52	B2	C2	R16	A1	B2
C54	B3	D2	R21	A2	B1
C59	B3	D3	R25	A2	B2
C63	B2	D2	R31	A2	B1
C67	A3	D2	R33	B2	C2
C71	A2	E1	R34	B2	C2
C78	B3	E3	R35	B2	C2
C83	A3	E2	R36	B2	B2
C85	A3	E2	R40	B2	C1
C87	A3	E3	R43	B2	C2
C94	B3	E2	R45	B2	C2
C95	A3	F2	R48	B3	C3
CR85	A3	E2	R49	B3	C3
CR91	A3	F2	R50	B2	D1
L13	A2	A2	R53	B3	C2
L15	A1	B2	R56	B3	D2
L52	A2	C2	R57	B3	C3
L62	A2	D1	R60	B3	D1
LR12	A2	A2	R63	B3	D2
Q02	A2	A1	R64	B3	D2
Q35	B2	C2	R66	B2	D2
Q70	A3	E1	R70	B2	D1
			R72	A3	E2
			R73	A3	E2
			R74	A3	E2
			R75	B2	E2
			R76	B3	E2

Intermediate Frequency Reference & Phase Shifter 8								
Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
R78	A3	E3	ASSY A52			R63	D3	D8
R81	A3	E1	C01	C2	A8	R70	C3	D8
R83	A3	E2	C03	C2	A8	R71	C3	D8
R84	A3	E2	C08	C1	A9	R72	C3	D8
R89	B3	E3	C10	C2	B8	R73	D3	E8
R90	A3	F1	C11	C2	B8	R74	D3	D8
R91	A3	F1	C16	C2	B9	R76	D3	D9
R96	B3	F3	C21	D2	B8	R77	D3	E9
R97	A3	E3	C22	D2	B8	R82	C3	E8
R98	A3	F3	C45	D4	C8	R84	D3	E8
R99	A3	F3	C46	C4	C8	R91	C3	E8
TP91	A3	F1	C47	D4	C9	R92	C3	F8
U23	A2	B2	C48	C5	C9	R93	C3	F8
U56A	B3	C2	C66	D1	D9	R94	C3	F8
U56B	B3	C2	C78	C4	E9	R96	D3	E9
Y18	A1	A3	C83	C3	E8	T58	C4	D9
ASSY A51			C88	C1	E9	TP33	D2	C8
C07	A4	A6	C89	C3	E9	U22	D2	B8
C08	A4	A6	C90	C3	E8	U81	C3	E8
C13	B4	B5	C94	C3	F8	U84	D3	E8
C16	B4	A5	C95	C3	F8	P/O ASSY A58		
C20	A4	B4	CR10	C2	B8	S22	C1	A2
C24	B4	B5	CR32	D2	B8	S25	B1	D2
C28	A4	B6	CR33	D2	B8	Component locations for A58 are shown on the reverse side of the power supply.		
C30	A4	B4	CR41	C3	C8	P/O ASSY A59		
C35	B4	B5	CR42	C3	C8	C04	C5	G3
C36	A4	C6	CR43	C3	C8	C06	C5	G3
C45	B4	C5	CR44	D3	C8	P07	B5	G4
C51	A5	D5	CR45	D3	C8	P08	D5	G4
C56	B4	D5	CR50	C3	D8	P93	D5	N2
C60	A5	D4	CR51	C3	D8	P95	C1	N3
C62	A5	D5	CR52	C3	D8	P98	B1	N4
C63	B5	D5	CR54	D3	D8	CHASSIS		
C64	A5	D5	CR55	D3	D8	C01	D1	D1
C66	B4	D6	CR63	C3	D8	C02	D1	D1
C84	A5	E5	CR64	D3	D8	C03	D1	D1
CR09	A4	A6	CR65	D3	D8	C04	D1	D1
CR47	B5	C6	E37	D4	C9	C05	D1	D1
CR48	B5	C6	L20	C2	B8	Static Sensitive Devices See Maintenance Section		
L03	A4	A5	L98	C3	E9	COMPONENT NUMBER EXAMPLE		
L18	A4	B6	LR47	C4	C9	Component Number A23 A2 R1234		
L31	A4	B4	P34	D3	C8	Assembly Number      Subassembly Number (if used)      Schematic Circuit Number		
L41	A5	C5	Q03	C2	B8	Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.		
LR12	A4	B5	Q15	C2	A8			
LR56	B4	D6	Q17	C2	A9			
LR71	A5	E5	Q18	C2	B9			
Q16	B4	B5	Q37	C4	C9			
Q22	A4	B5	Q38	C4	C9			
Q32	A4	C5	Q59	C4	C9			
Q35	B4	C5						
Q72	A5	E5	R03	C2	A8			
Q74	A5	E5	R05	C1	A8			
R10	A4	B4	R06	C2	A9			
R11	A4	B5	R07	C2	A9			
R13	B4	B5	R09	C1	A9			
R15	B4	B5	R13	C2	B8			
R21	A4	B5	R14	C2	B8			
R23	B4	B5	R15	C2	B8			
R26	B4	B5	R18	C1	B9			
R27	A4	B6	R19	C1	B9			
R46	B4	C5	R25	C4	B8			
R52	A5	D5	R26	C4	B9			
R53	A5	D5	R34	D4	B8			
R54	B5	D5	R36	D4	B9			
R57	B5	D6	R39	C5	C9			
R58	B5	D5	R52	C3	D8			
R62	A5	D5	R53	C3	C8			
R65	A5	D5	R55	D3	C8			
R81	A5	E5	R56	D3	D9			
R83	A5	E5	R57	C4	D9			
R84	A5	E5	R58	C4	D9			
R85	A5	E5	R61	C3	D8			
			R62	C3	D8			

8







1450-1

A B C D E F

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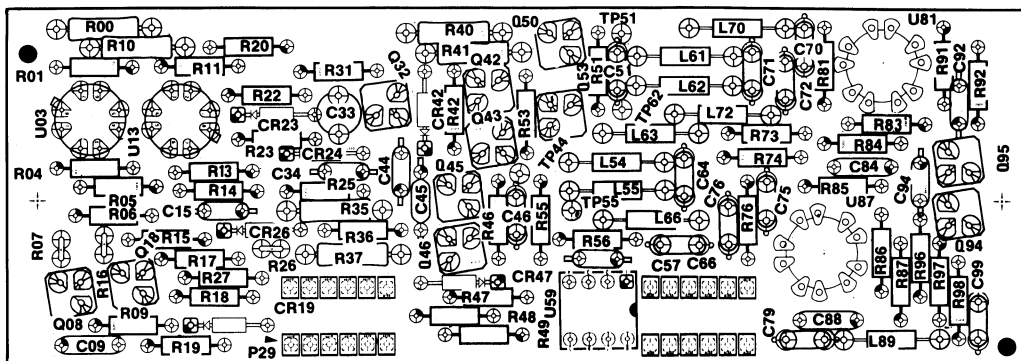
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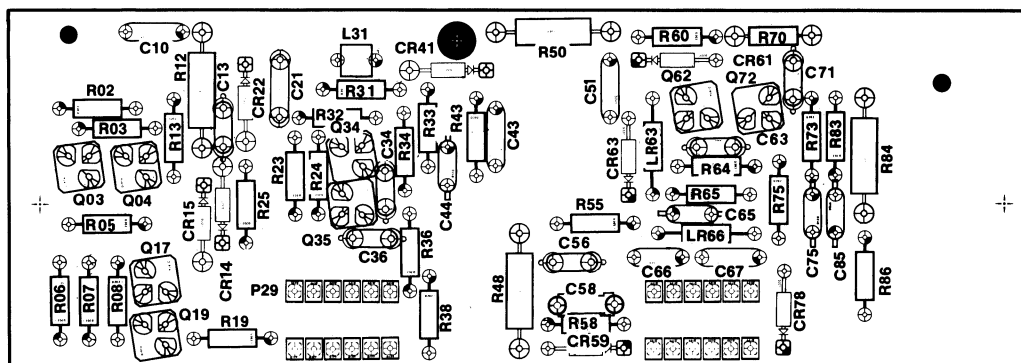
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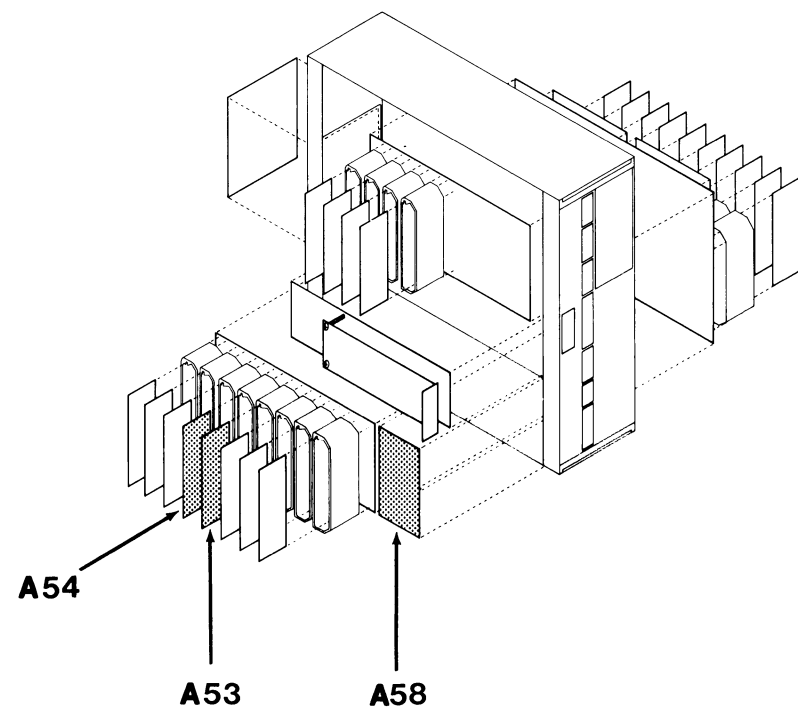
9



A53 CONVERTER PHASE LOCK BOARD

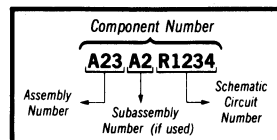


A54 DETECTOR-LO SWITCH BOARD



⚡ Static Sensitive Devices  
See Maintenance Section

#### COMPONENT NUMBER EXAMPLE



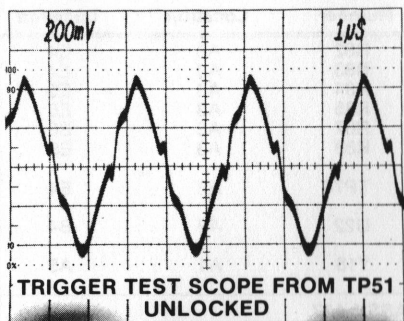
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

#### Converter Phase Lock & Detector LO Switch

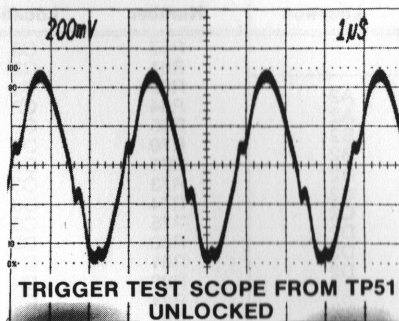
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Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
<b>ASSY A53</b>			R18	A3	B2	CR59	D3	D9
C09	A3	A3	R19	C3	B3	CR61	D4	D7
C15	C3	B2	R20	C4	B1	CR63	D4	D8
C33	C4	B1	R22	B4	B1	CR78	D3	E9
C34	C3	B2	R23	C4	B1			
C44	C4	C2	R25	B3	B2	L31	D4	C7
C45	C4	C2	R26	A3	B2	LR63	D1	D8
C46	C2	C2	R27	A1	B2	LR66	D2	D8
C51	B3	D1	R31	C4	B1			
C57	C3	D2	R35	C3	B2	Q03	D3	A8
C64	C2	D2	R36	C3	C2	Q04	D4	A8
C66	B1	D2	R37	C3	B2	Q17	D4	B8
C70	B2	E1	R40	A3	C1	Q19	D3	B9
C71	B2	E1	R41	A4	C1	Q34	D5	C8
C72	A2	E1	R42	B3	C1	Q35	D5	C8
C75	C2	E2	R46	C2	C2	Q62	D1	D8
C76	C2	D2	R47	C3	C2	Q72	D1	E8
C79	C1	E2	R48	C3	C2			
C84	B1	E2	R49	C3	C2	R02	D4	A8
C88	A1	E2	R51	B3	D1	R03	D3	A8
C92	B2	F1	R53	B3	C1	R05	D4	A8
C94	C2	E2	R55	C3	C2	R06	D3	A9
C99	C1	F2	R56	C3	D2	R07	D3	A9
			R73	C1	E1	R08	D3	A9
CR19	A3	B2	R74	B1	E2	R12	D4	B7
CR23	C4	B1	R76	C2	E2	R13	D3	B8
CR24	C3	B2	R81	B2	E1	R19	D3	B9
CR26	C3	B2	R83	C2	E1	R23	D4	B8
CR42	C4	C1	R84	B2	E1	R24	D5	B8
CR47	C3	C2	R85	C1	E2	R25	D4	B8
L54	C2	D2	R86	B1	E2	R31	D4	C8
L55	C2	D2	R87	C2	E2	R32	D5	B8
L61	B2	D1	R91	B2	F1	R33	D5	C8
L62	A3	D1	R92	B2	F1	R34	D5	C8
L63	C2	D1	R96	C2	E2	R36	D5	C8
L66	C2	D2	R97	C1	F2	R38	D5	C9
L70	B2	D1	R98	C1	F2	R43	D5	C8
L72	A2	D1				R48	D3	C9
L89	C1	E2	TP44	C2	D2	R50	D4	D7
Q08	A3	A2	TP51	B3	D1	R55	D1	D8
Q18	A4	A2	TP55	C3	D2	R58	D3	D9
Q32	C4	C1	TP62	A3	D1	R60	D4	D7
Q42	C4	C1				R64	D1	D8
Q43	B3	C1	U03	A1	A1	R65	D1	D8
Q45	C3	C2	U13	B4	B1	R70	D2	E7
Q46	C3	C2	U59A	C3	D2	R73	D2	E8
Q50	B3	D1	U59B	C3	D2	R75	D1	E8
Q53	A3	D1	U81	B2	E1	R83	D1	E8
Q94	C2	F2	U87	C2	E2	R84	D1	E8
Q95	B2	F2				R86	D1	E8
R00	B3	A1	<b>ASSY A54</b>			<b>P/O ASSY A58</b>		
R01	A1	A1	C10	D4	B7	CR51	C5	A2
R04	A1	A2	C13	D4	B8	P60	C5	A2
R05	A1	A2	C21	D4	B8	R52	C5	B2
R06	A1	A2	C34	D5	C8	R53	C5	B2
R07	A3	A5	C36	D5	C8	R61	C5	A2
R09	A4	A2	C43	D4	C8	S22	C5	A2
R10	B4	A1	C44	D5	C8	<b>Component locations for A58 are shown on the reverse side of the power supply.</b>		
R11	B4	B1	C51	D4	D7	<b>CHASSIS</b>		
R13	C3	B2	C56	D1	D8	DS2	B5	
R14	C3	B5	C58	D3	D9			
R15	C3	B5	C63	D1	D8			
R16	A1	B5	C65	D1	D8			
R17	A3	B2	C66	D2	D8			
			C67	D1	D8			
			C71	D2	E7			
			C75	D3	E8			
			C85	D1	E8			
			CR14	D4	B8			
			CR15	D4	B8			
			CR22	D4	B8			
			CR41	D4	C7			

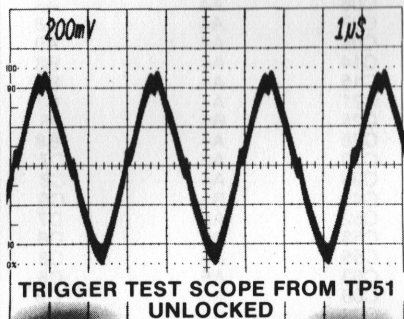
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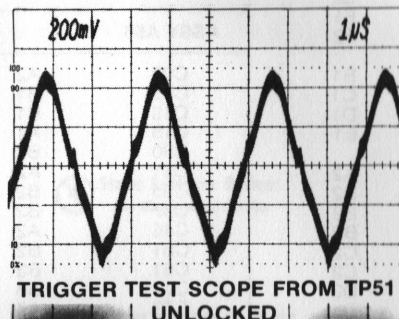
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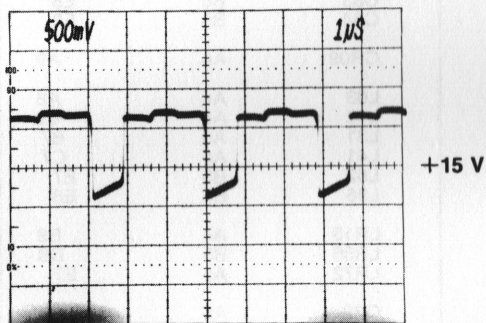
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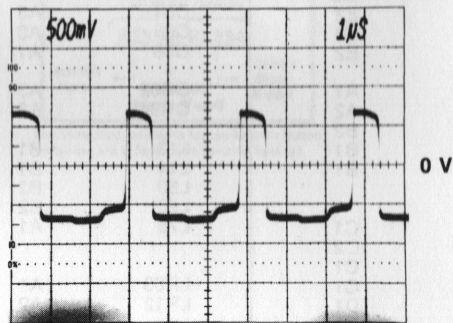
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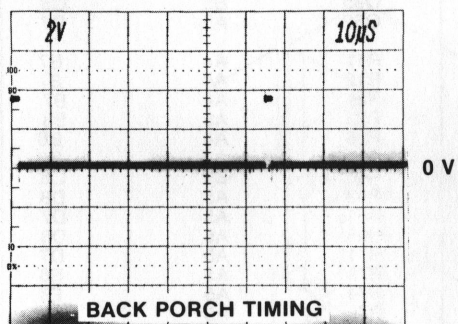
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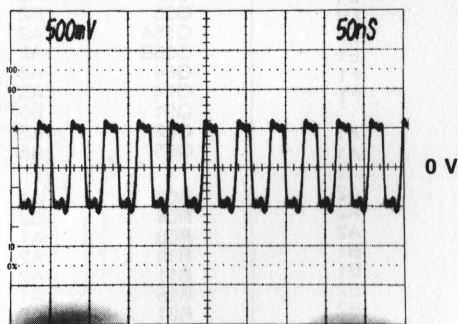
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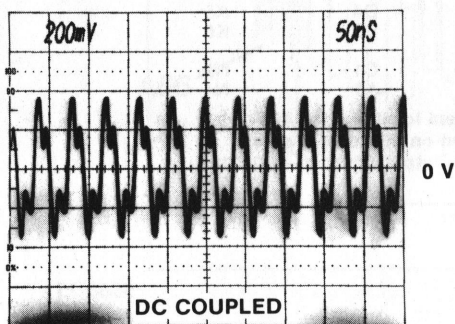
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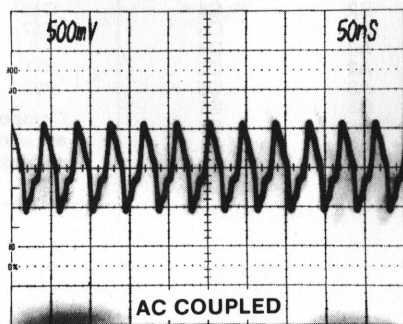
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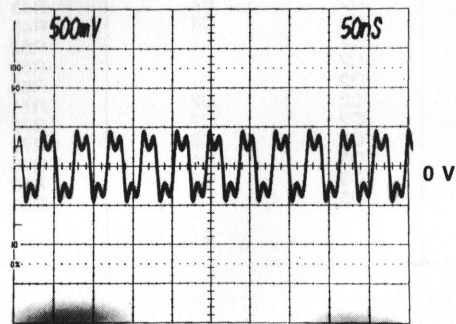
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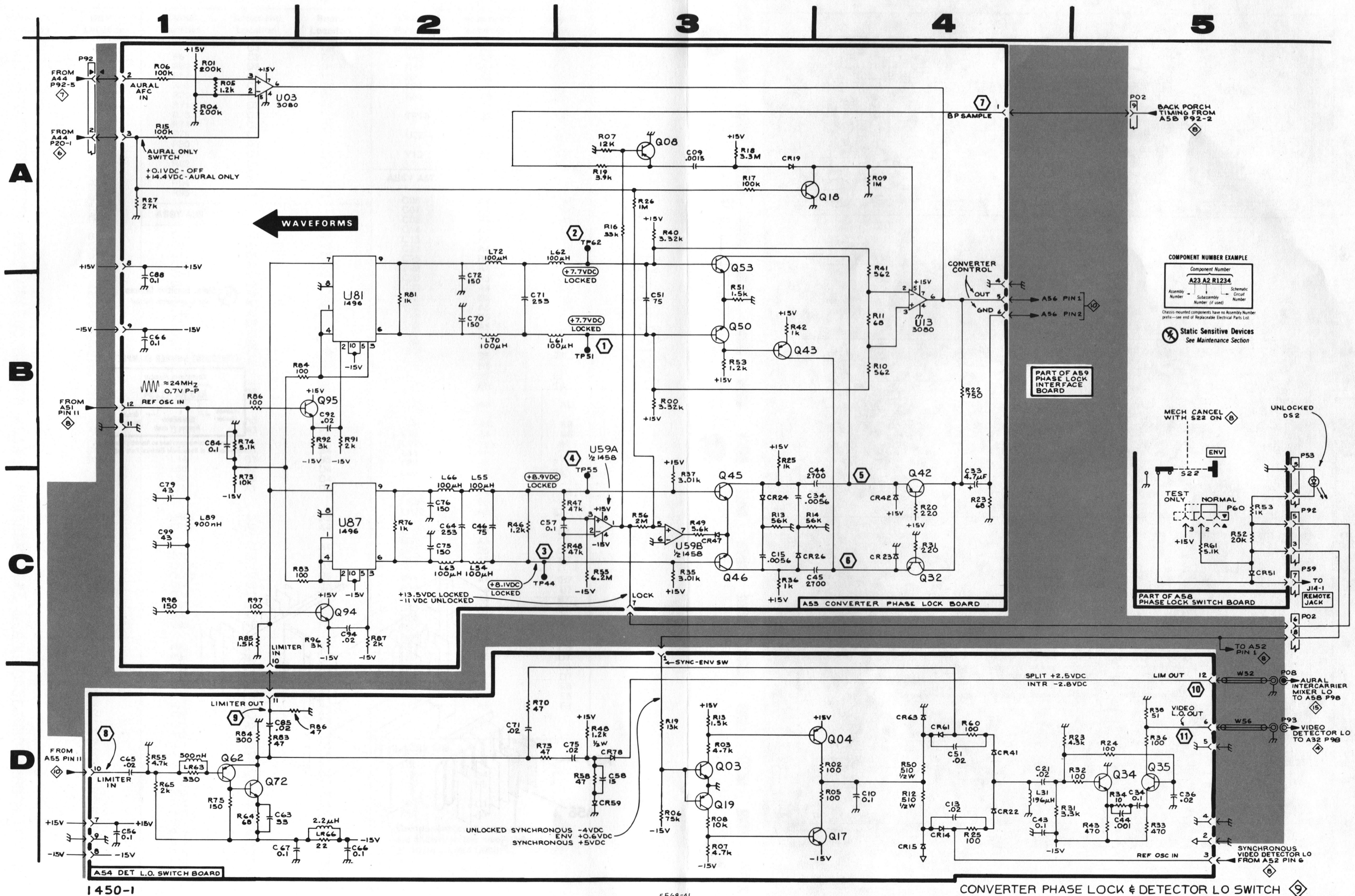
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11







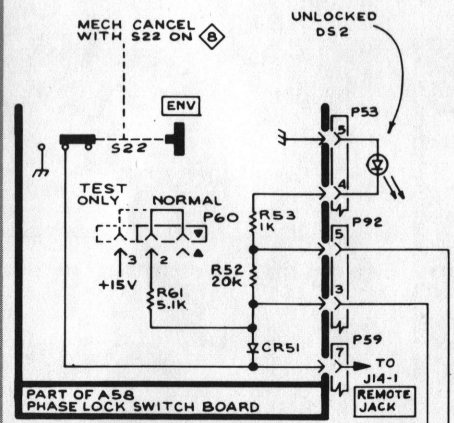
**COMPONENT NUMBER EXAMPLE**

Component Number			
A23	A2	R1234	
Assembly	Subassembly	Part Number	Quantity

Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

**Static Sensitive Devices**  
See Maintenance Section

**PART OF A59 PHASE LOCK INTERFACE BOARD**



CONV. PHASE LOCK & DET.  
LO SWITCH A53, A54, A58, A59

A

B

C

D

E

F

1

2

3

4

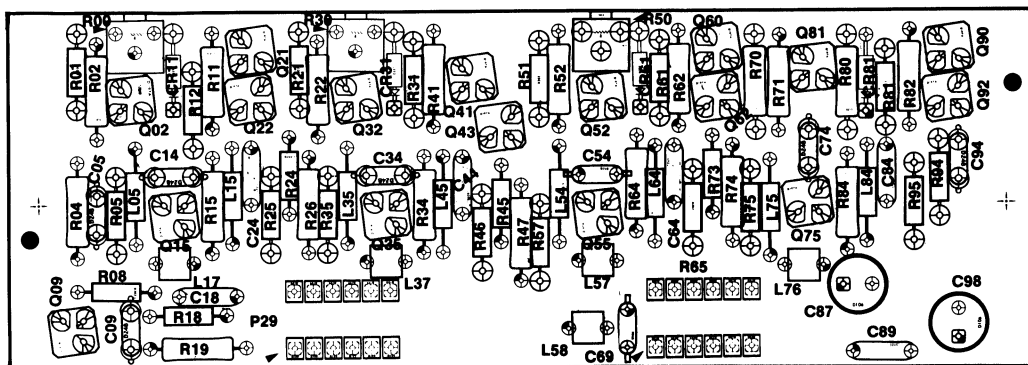
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6

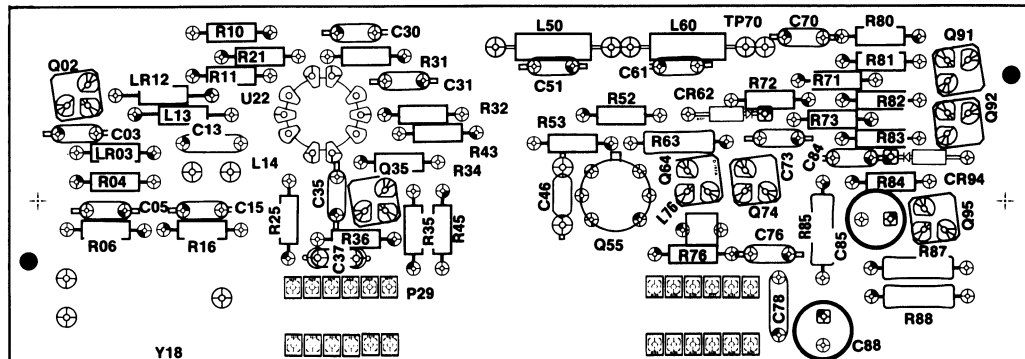
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8

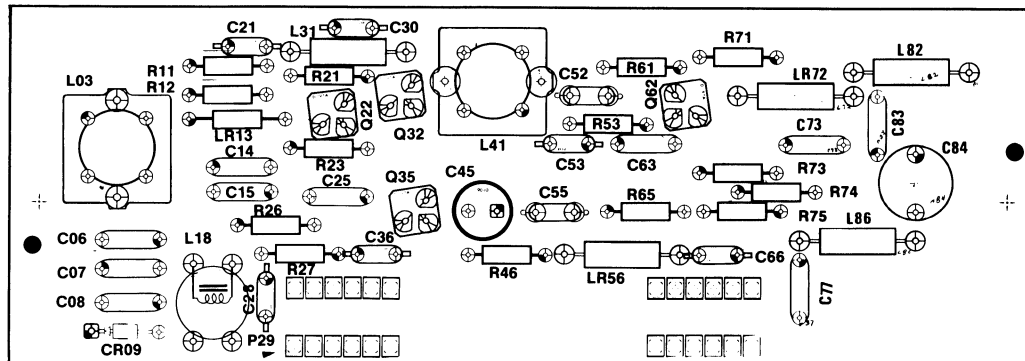
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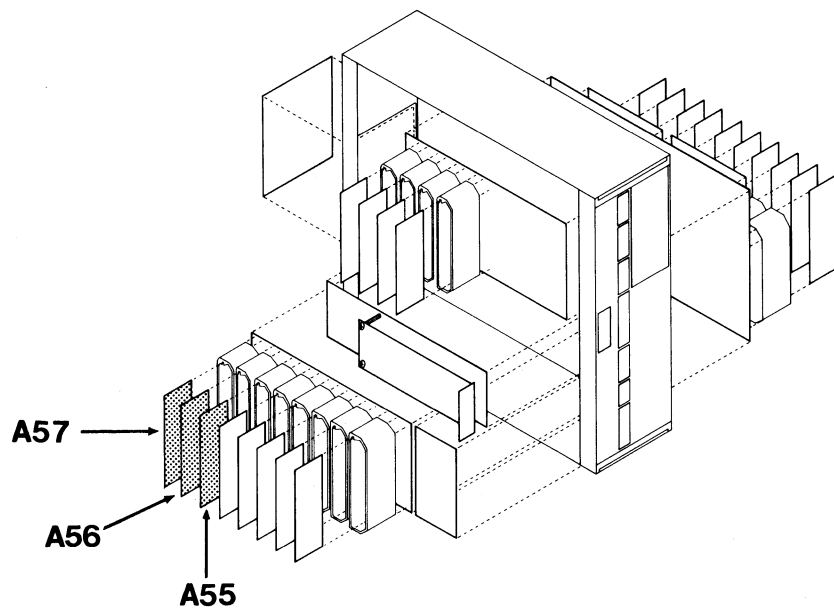
A55 LIMITER BOARD



A56 CONVERTER CONTROL BOARD

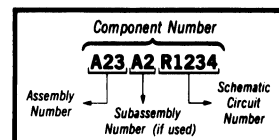


A57 CONVERTER OSCILLATOR BOARD




 Static Sensitive Devices  
See Maintenance Section

#### COMPONENT NUMBER EXAMPLE

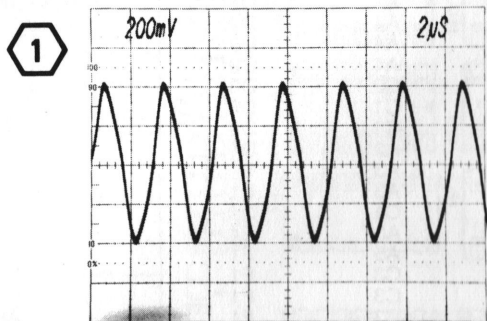


Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

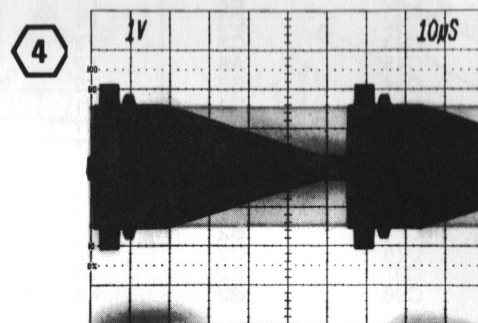
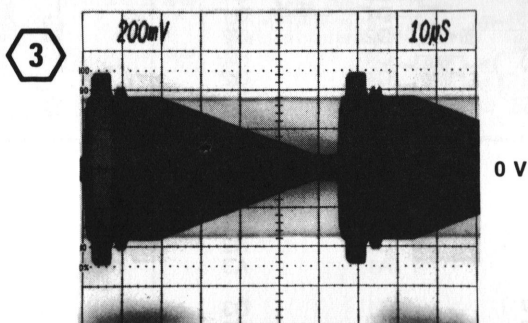
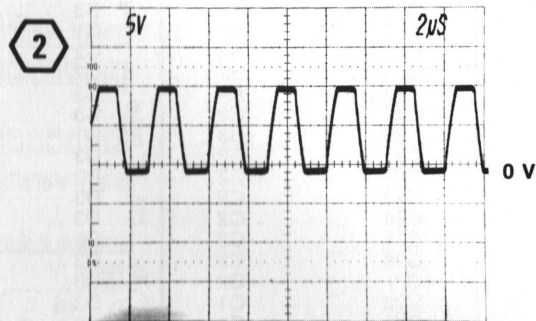
Converter LO & Limiter 								
Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
<b>ASSY A55</b>			R57	C3	C2	R82	A3	E4
C05	C1	A2	R61	C3	D1	R83	A3	E4
C09	C1	A2	R62	D3	D1	R84	A3	E5
C14	C2	B2	R64	C3	D2	R85	A3	E5
C18	D2	B2	R65	C3	D2	R87	A3	E5
C24	C2	B2	R70	D3	E1	R88	A3	E5
C34	C2	C2	R71	D3	E1	TP70	B3	E4
C44	C2	C2	R73	C3	D2	U22	A2	B4
C54	C3	D2	R74	C3	D2	Y18	A1	A5
C64	C3	D2	R75	C3	E2	<b>ASSY A57</b>		
C69	C4	D2	R80	D3	E1	C06	A4	A8
C74	C3	E1	R81	C3	E1	C07	A4	A8
C84	C3	E2	R82	D4	E1	C08	A4	A9
C87	C3	E2	R84	C3	E2	C14	A4	B8
C89	D3	E2	R94	C4	E2	C15	A4	B8
C94	C4	F1	R95	C4	E2	C21	A4	B7
C98	D4	F2	<b>ASSY A56</b>			C25	B5	B8
CR11	D1	B1	C03	A2	A4	C28	A4	B8
CR31	D2	C1	C05	B1	A5	C30	A5	C7
CR61	D3	D1	C13	B1	B4	C36	A4	C8
CR81	D3	E1	C15	A1	B5	C45	B5	C8
L05	C1	A2	C30	B2	C4	C52	A5	D7
L15	C2	B2	C31	A2	C4	C53	B5	D8
L17	C1	B2	C35	B2	B5	C55	A5	C8
L35	C2	B2	C37	B2	B5	C63	A5	D8
L37	C2	C2	C46	A2	D5	C66	A5	D8
L45	C2	C2	C51	B2	D4	C73	B5	E8
L54	C2	D2	C61	B3	D4	C77	B5	E8
L57	C2	D2	C70	B3	E4	C83	B5	E8
L58	C4	D2	C73	A3	E4	C84	B5	E8
L64	C3	D2	C76	A3	E5	CR09	A4	A9
L75	C3	E2	C78	A1	E5	L03	A4	A8
L76	C3	E2	C84	A3	E5	L18	A4	B8
L84	C3	E2	C85	A3	E5	L31	A5	B7
Q02	D2	A1	C88	A1	E6	L41	A5	C7
Q09	C1	A2	CR62	A3	D4	L82	B5	E7
Q15	C1	B2	CR94	A3	F5	L86	B5	E8
Q21	D2	B1	L13	B1	B4	LR13	A4	B8
Q22	C2	B1	L14	B1	B5	LR56	B5	D8
Q32	D2	C1	L50	B2	D4	LR72	A5	E7
Q35	C2	C2	L60	B2	D4	Q22	A5	B8
Q41	D2	C1	L76	A1	D5	Q32	A5	C8
Q43	C2	C1	LR03	A1	A5	Q35	B5	C8
Q52	D3	D1	LR12	A2	A4	Q62	A5	D7
Q55	C3	D2	Q02	A2	A4	R11	A4	B7
Q60	D3	D1	Q35	B2	C5	R12	A4	B7
Q62	C3	D1	Q55A	A2	D5	R21	A4	B7
Q75	C3	E2	Q55B	A2	D5	R23	A5	B8
Q81	D3	E1	Q64	A3	D5	R26	A4	B8
Q90	D4	F1	Q74	A3	E5	R27	A4	B8
Q92	C4	F1	Q91	B3	F4	R46	B5	C8
R00	D1	A1	Q92	B3	F4	R53	A5	D8
R01	D1	A1	Q95	A3	F5	R61	A5	D7
R02	D2	A1	R03	A1	A5	R65	A5	D8
R04	C1	A2	R04	B2	A5	R71	A5	D7
R05	C1	A2	R06	A1	A5	R73	A5	E8
R08	C1	A2	R10	A2	B4	R74	A5	E8
R11	D2	B1	R11	A2	B4	R75	A5	E8
R12	C2	B1	R16	A1	B5	<b>P/O ASSY A59</b>		
R15	C2	B2	R21	A2	B4	C55	C4	K5
R18	D1	B2	R25	A2	B5	C56	D4	K5
R19	C1	B2	R31	A2	C4	C57	B5	K5
R21	D2	B1	R32	B2	C4	P91	C1	N2
R22	D2	B1	R34	B2	C5	P97	A5	N4
R24	C2	B2	R35	B2	C5	<b>Component locations for A59 are shown on the reverse side of Audio Output B000100—B010187.</b>		
R25	C2	B2	R36	B2	B5			
R26	C2	B2	R43	B2	C4			
R30	D2	B1	R45	B2	C5			
R31	C2	C1	R52	A2	D4			
R34	C2	C2	R53	A2	D5			
R35	C2	B2	R63	A3	D5			
R41	D2	C1	R71	B3	E4			
R45	C2	C2	R72	B3	E4			
R46	C2	C2	R73	A3	E4			
R47	C2	C2	R76	A3	D5			
R50	D3	D1	R80	B3	E4			
R51	D3	C1	R81	B3	E4			
R52	D3	D1						



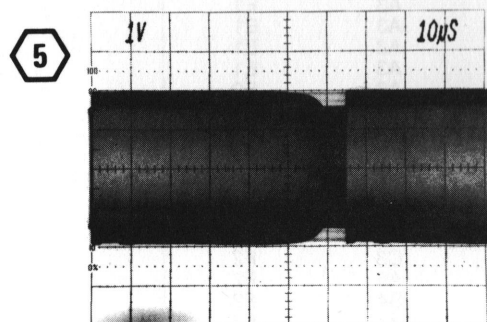
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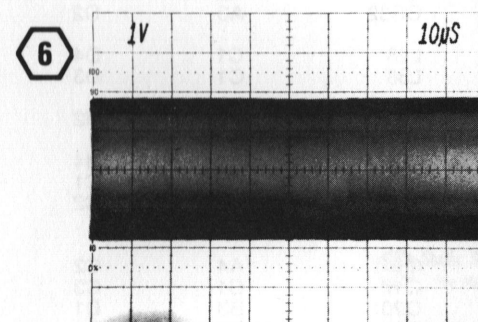
AC COUPLED



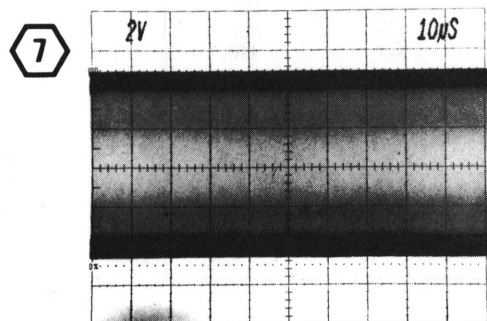
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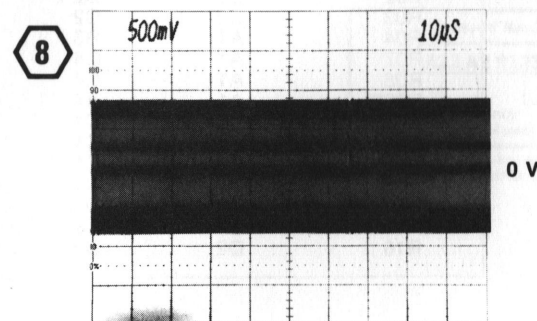
AC COUPLED



AC COUPLED



AC COUPLED



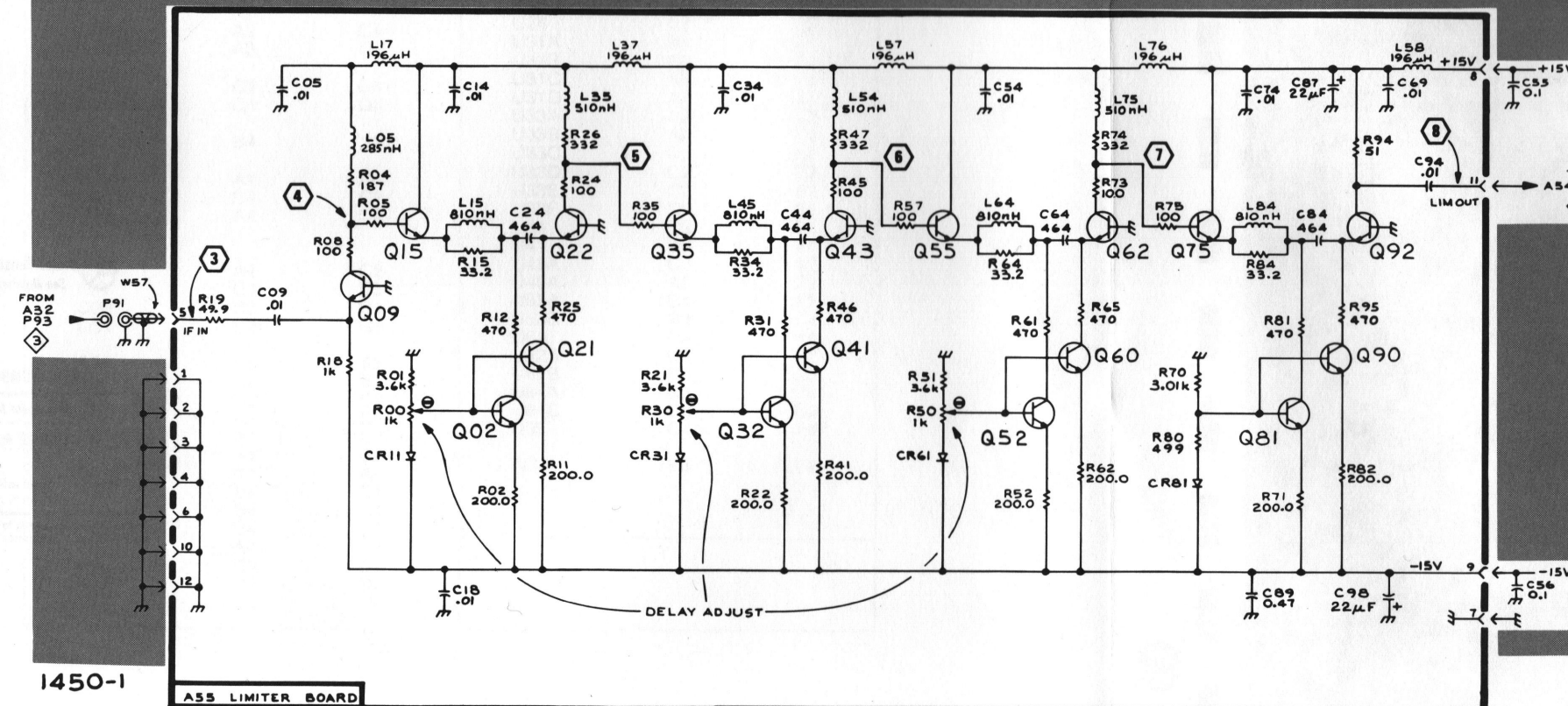
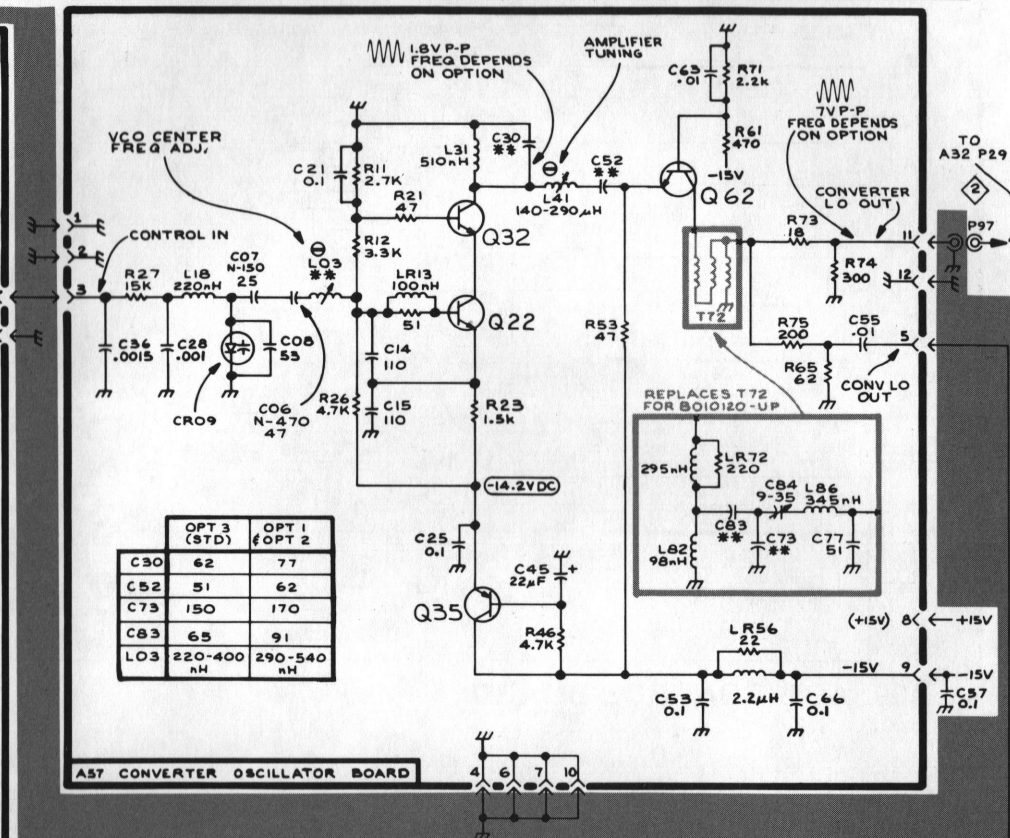
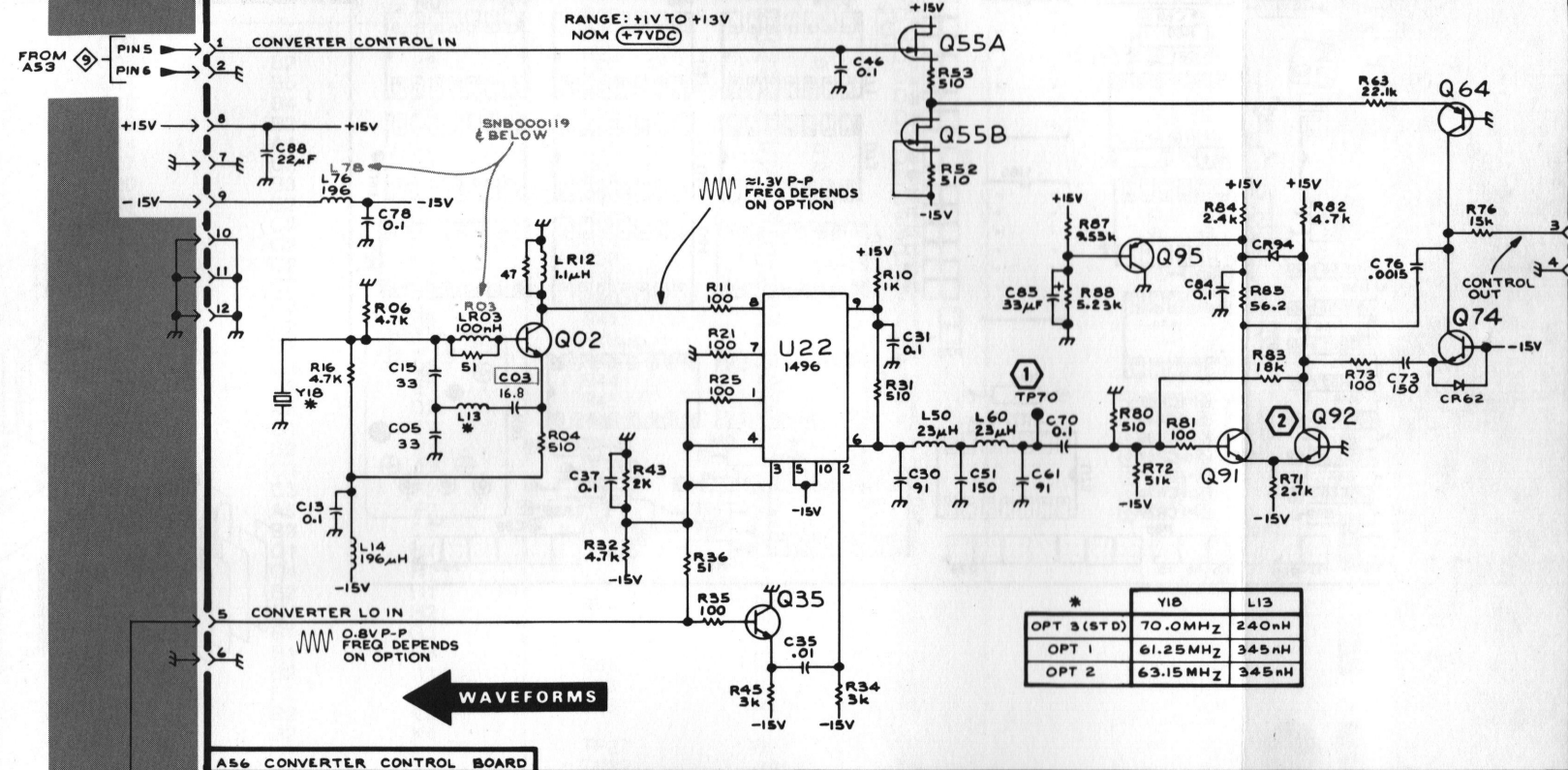
1

2

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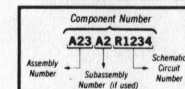
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5



PART OF A59 PHASE LOCK INTERFACE BOARD

COMPONENT NUMBER EXAMPLE

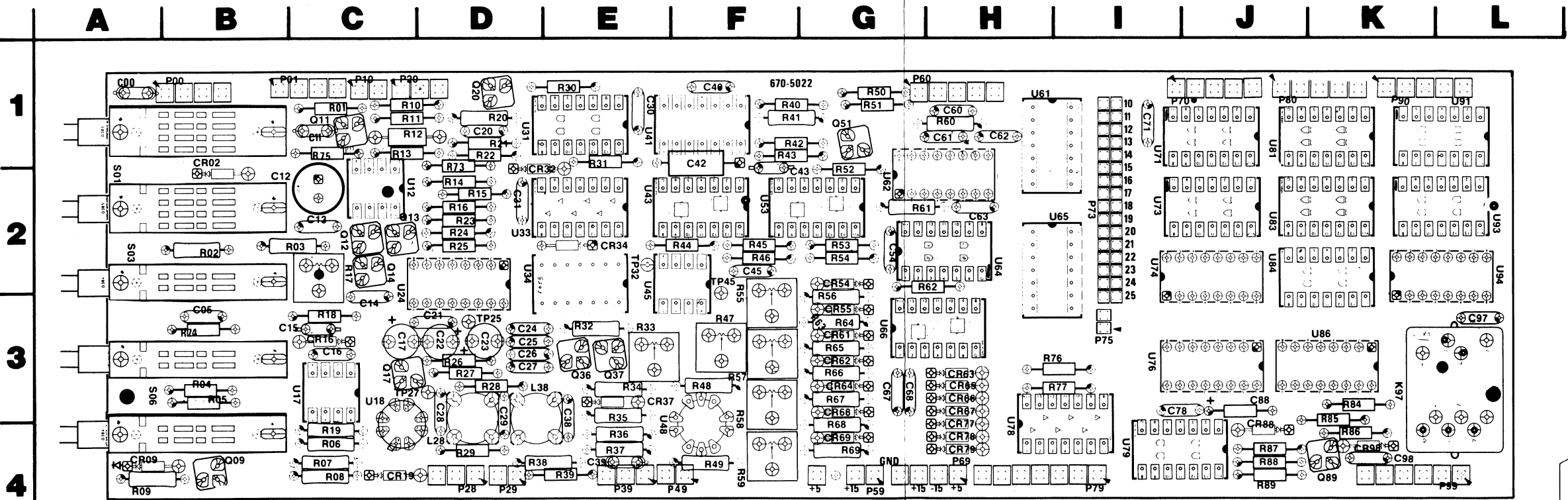


Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

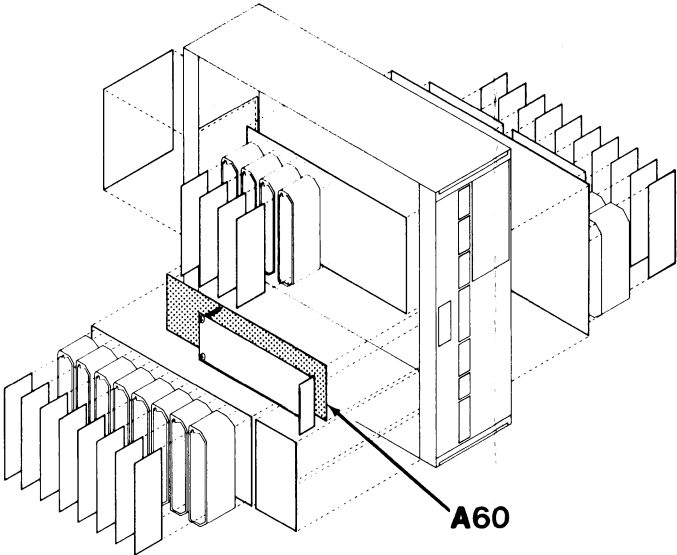
Static Sensitive Devices  
See Maintenance SectionSEE PARTS LIST FOR EARLIER  
VALUES AND SERIAL NUMBER  
RANGES OF PARTS OUTLINED  
OR DEPICTED IN GREY.

CONVERTER LO &amp; LIMITER



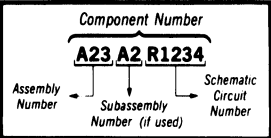


A60 AGC CONTROL BOARD



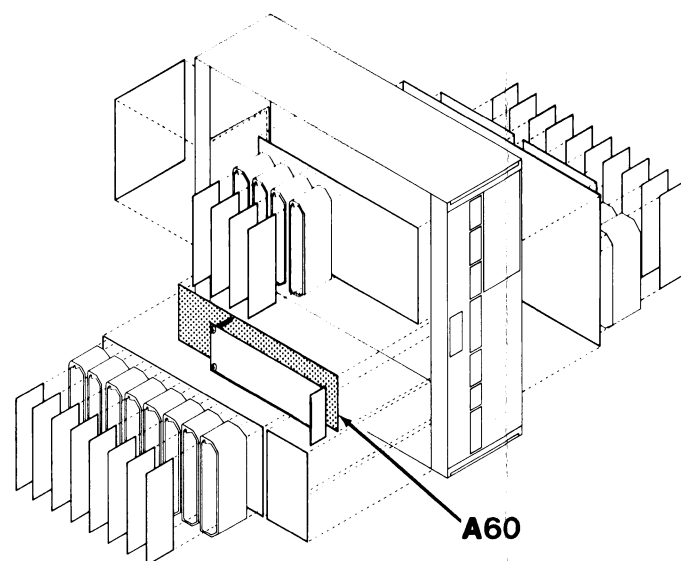
Static Sensitive Devices  
See Maintenance Section

COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

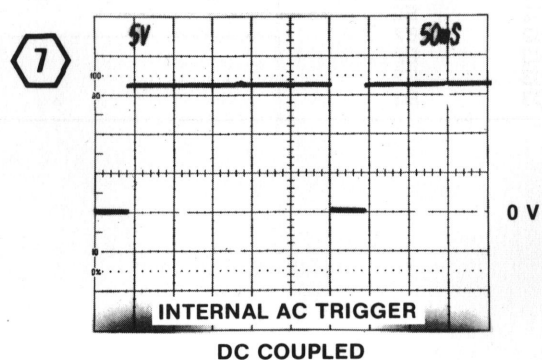
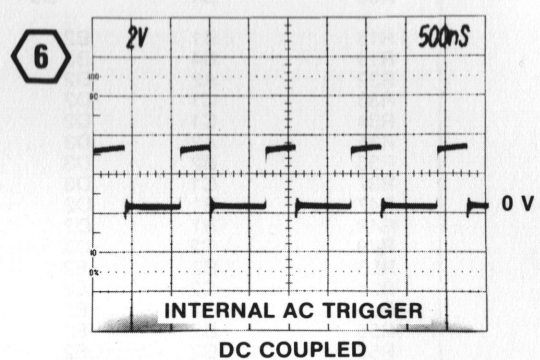
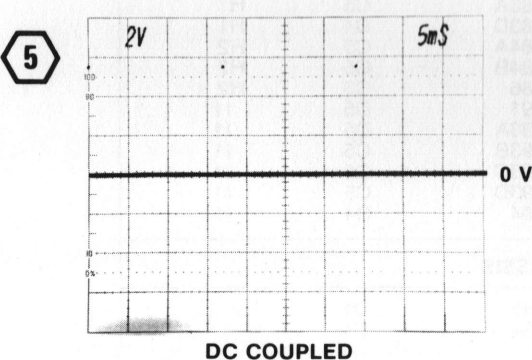
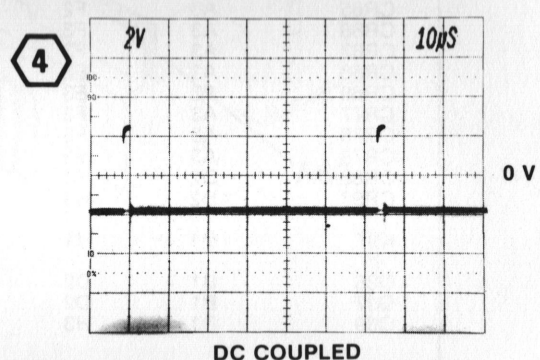
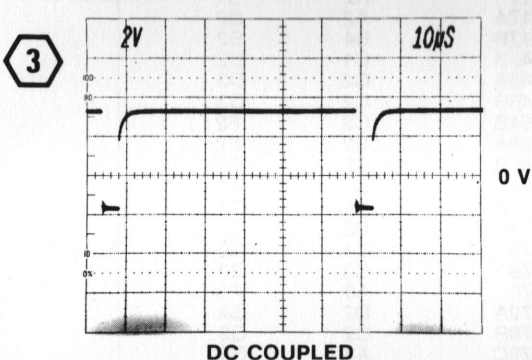
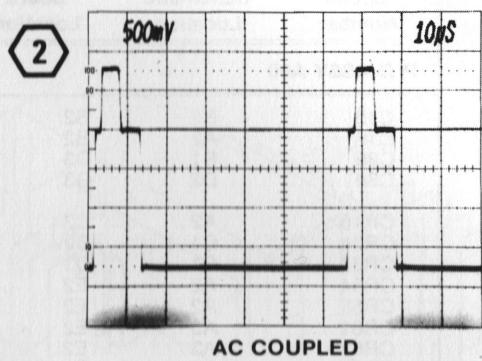
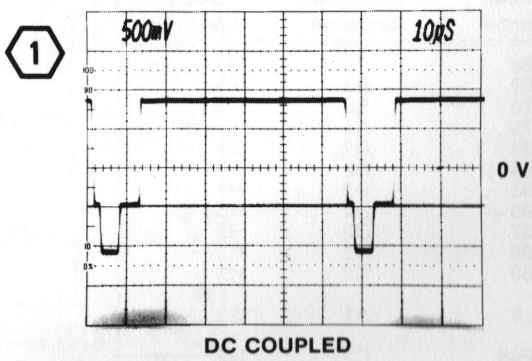
COMPONENT LOCATIONS  
A60



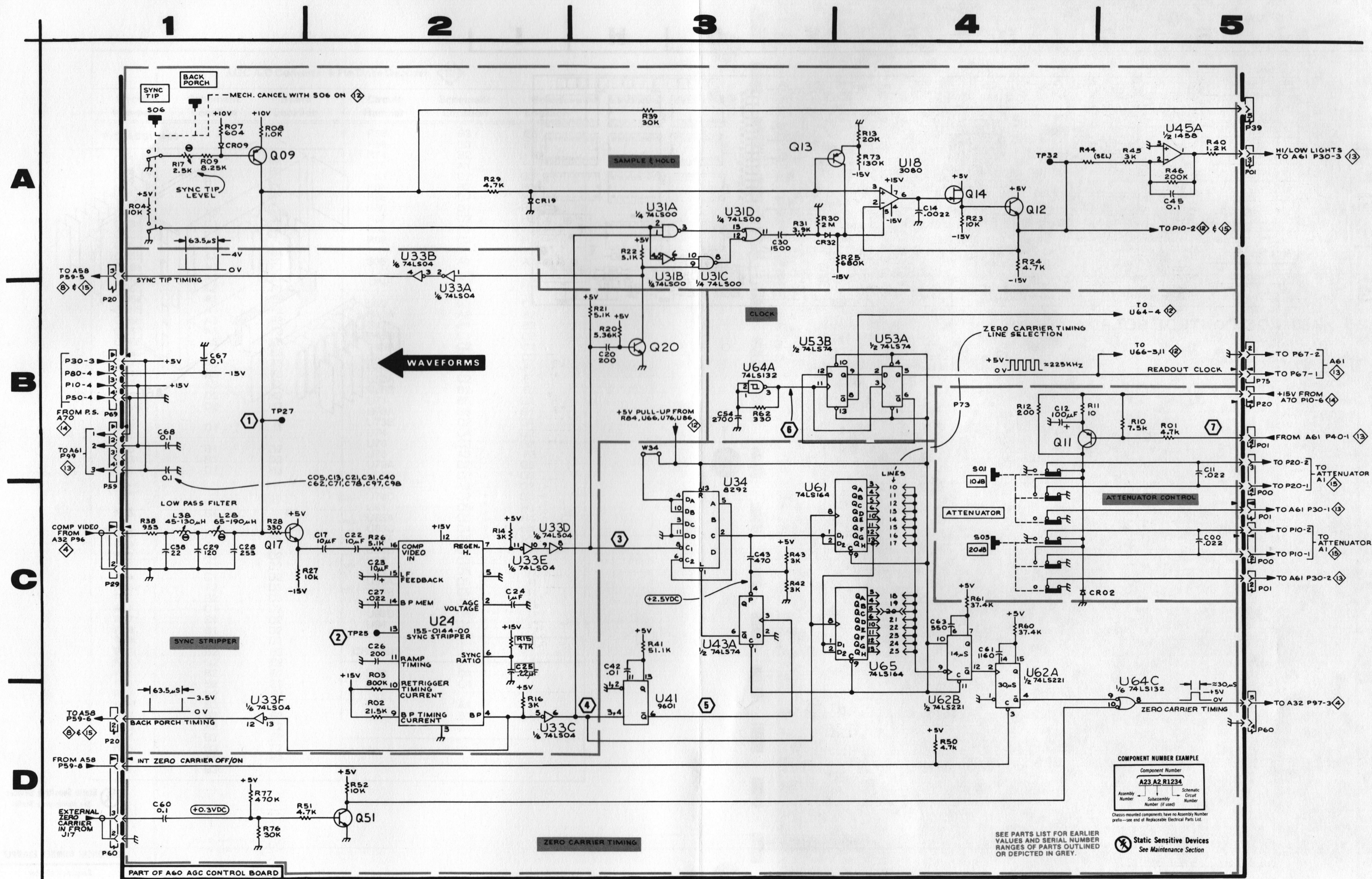
**Component Number**  
**A23 A2 R1234**

Assembly Number      Subassembly Number (if used)      Schematic Circuit Number

AGC Sample & Hold and Zero Carrier Timing			11		
Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
P/O ASSY A60			R17	A1	C2
C00	C5	A1	R20	B3	D1
C05	B2	B3	R21	B3	D1
C11	B5	C1	R22	A3	D1
C12	B4	C2	R23	A4	D2
C13	B2	C2	R24	A4	D2
C14	A4	C3	R25	A4	D2
C17	C2	C3	R26	C2	D3
C20	B3	D1	R27	C1	D3
C21	B2	D3	R28	C1	D3
C22	C2	D3	R29	A2	D4
C23	C2	D3	R30	A3	E1
C24	C2	D3	R31	A3	E1
C25	C2	D3	R38	C1	D4
C26	C2	D3	R39	A3	E4
C27	C2	D3	R40	A5	F1
C28	C1	D3	R41	C3	F1
C29	C1	D3	R42	C3	F1
C30	A3	E1	R43	C3	F1
C31	B2	D2	R44	A4	F2
C38	C1	E3	R45	A5	F2
C40	B2	F1	R46	A5	F2
C42	C3	F1	R50	D4	G1
C43	C3	F2	R51	D1	G1
C45	A5	F2	R52	D2	G2
C54	B3	C5	R60	C4	H1
C60	D1	H1	R61	C4	G2
C61	C4	H1	R62	B3	G2
C62	B2	H1			
C63	C4	H2	R76	D1	I3
C67	B1	G3	R77	D1	I3
C68	B1	G3			
C71	B2	I1	S01	B4	A2
C78	B2	I3	S03	C4	A2
C97	B2	L3	S06	A1	A3
C98	B2	K4			
CR02	C4	B2	TP27	B1	D3
CR09	A1	A4	TP32	A4	E2
CR19	A2	C4			
CR32	A3	D2	U18	A4	C3
L28	C1	D4	U24	C2	D2
L38	C1	D3	U31A	A3	E1
P73	B4	I2	U31B	A3	E1
Q09	A1	B4	U31C	A3	E1
Q11	B4	C1	U31D	A3	E1
Q12	A4	C2	U33A	A2	E2
Q14	A4	C2	U33B	A2	E2
Q17	C1	C3	U33C	D2	E2
Q20	B3	D1	U33D	C2	E2
Q51	D2	G1	U33E	C2	E2
R01	B5	C1	U33F	D1	E2
R02	D2	B2	U34	C3	E2
R03	C2	C2	U41	D3	F1
R04	A1	B3	U43A	C3	F2
R07	A1	C4	U45A	A5	F2
R08	A1	C4	U53A	B4	F2
R09	A1	A4	U53B	B3	F2
R10	B5	C1	U61	C4	H1
R11	B4	C1	U62A	C4	G2
R12	B4	C1	U62B	C4	G2
R13	A4	C1	U64A	B3	H2
R14	C2	D2	U64C	D5	H2
R15	C2	D2	U65	C4	H2
R16	D2	D2	W34	B3	E2







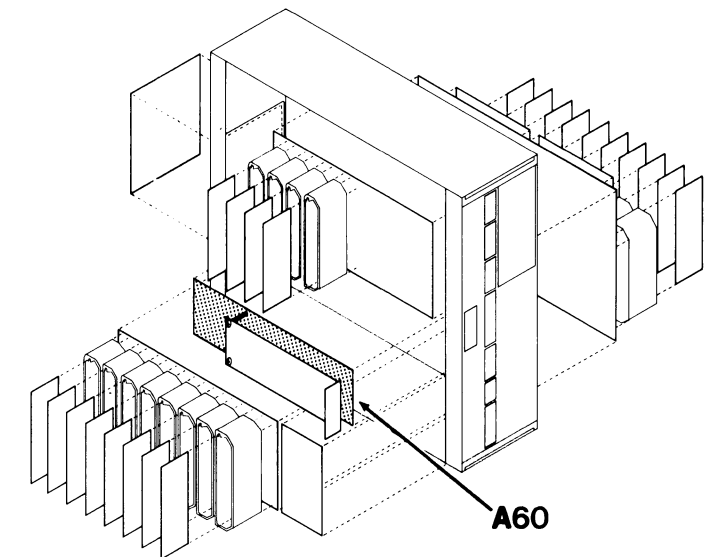
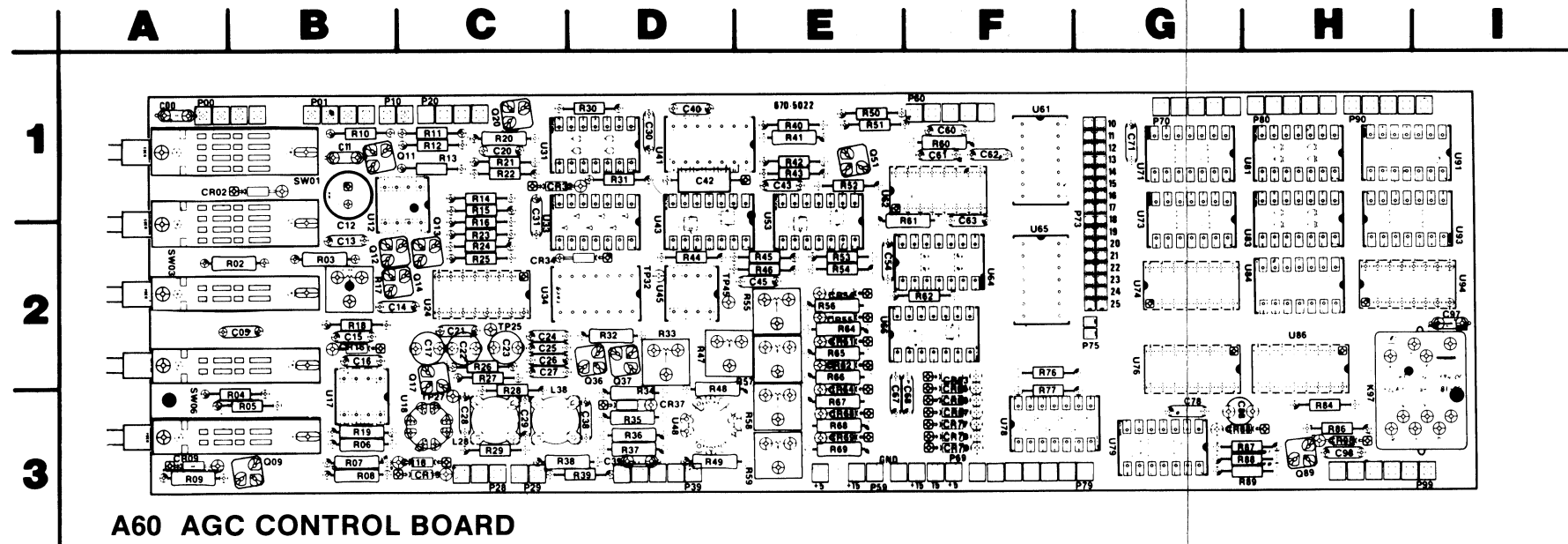
1450-1

5568-43  
REVISED AUG 1986

AGC SAMPLE & HOLD and ZERO CARRIER TIMING

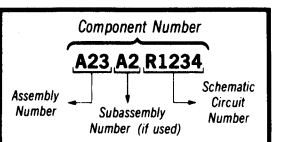
ZERO CARRIER TIMING  
A60

11



 Static Sensitive Devices  
See Maintenance Section

#### COMPONENT NUMBER EXAMPLE



Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

## AGC A/D Converter &amp; Pin Drive Decoder

12

Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
<b>P/O ASSY A60</b>			R68	B3	E3
C15	B2	B2	R69	B3	E3
C16	A2	B2	R74	B2	B2
C39	B1	D3	R75	A1	C1
C88	D2	G3	R83	D2	G3
CR16	A2	B2	R84	B2	H3
CR34	C1	D2	R85	D2	H3
CR37	C1	D3	R86	D1	H3
CR54	A2	E2	R87	D2	H3
CR55	A2	E2	R88	D2	H3
CR61	A3	E2	R89	C2	H3
CR62	A3	E2	S06	A1	A3
CR63	A3	F2	TP45	C2	D2
CR64	A3	E2	U12	A2	C1
CR65	A3	F2	U17A	A2	B2
CR66	A3	F3	U17B	B4	B2
CR67	A3	F3	U45B	C1	D2
CR68	A3	E3	U48A	C2	D3
CR69	A3	E3	U48B	C2	D3
CR77	A3	F3	U64B	C3	F2
CR78	A3	F3	U66A	C2	E2
CR79	A3	F3	U66B	B2	E2
CR88	D2	H3	U71	B5	G1
CR98	D2	H3	U73A	B5	G1
K97	D1	I1	U73B	C2	G1
Q36	B1	D2	U74	C4	G2
Q37	B1	D2	U76	C3	G2
Q89	D1	H3	U78	A3	F3
R06	B4	B3	U79A	D2	G3
R18	B1	B2	U79B	C2	G3
R19	B4	B3	U79C	A3	G3
R32	A2	D2	U79D	D2	G3
R33	C1	D2	U81	C5	H1
R34	C1	D2	U83A	C5	H1
R35	A2	D3	U83D	D4	H1
R36	B2	D3	U84A	C5	H2
R37	C1	D3	U84B	C5	H2
R47	B1	D2	U86	C3	H2
R48	B1	D2	U91	D5	I1
R49	C2	D3	U93A	D5	I1
R53	B2	E2	U93B	C5	I1
R54	C2	E2	U93C	C5	I1
R55	B2	E2	U93D	C5	I1
R56	B2	E2	U94	D4	I1
R57	B2	E2	<b>CHASSIS</b>		
R58	B3	E3	DS3	D1	
R59	B3	E3	DS4	C1	
R63	A2	E2	R1	A1	
R64	B2	E2	R2	B1	
R65	B3	E2			
R66	B3	E2			
R67	B3	E3			





A B C D E F G

1

2

3

4

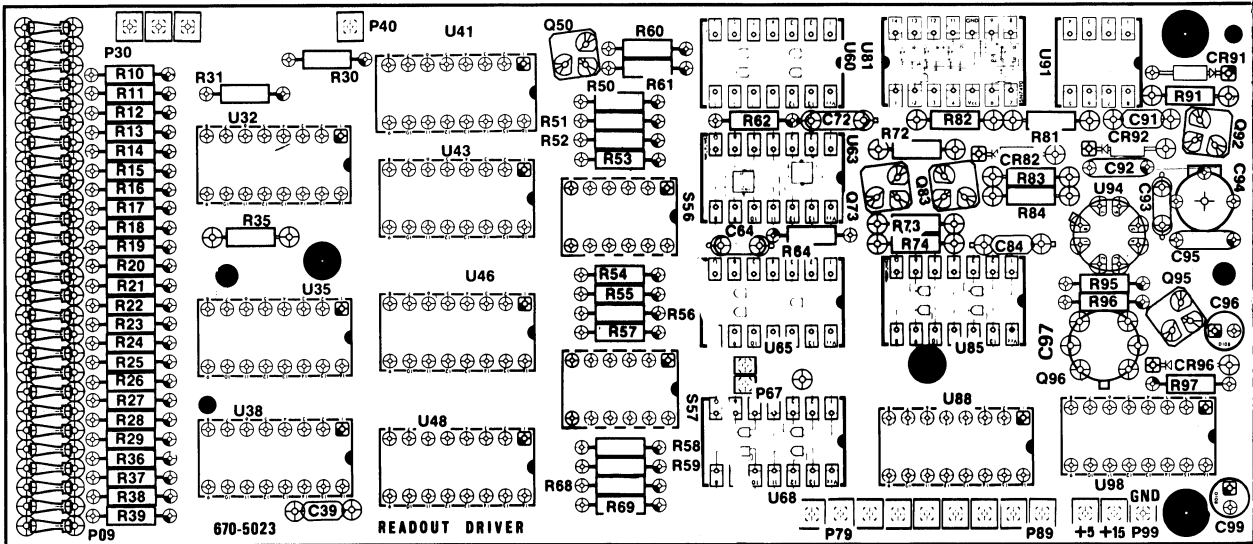
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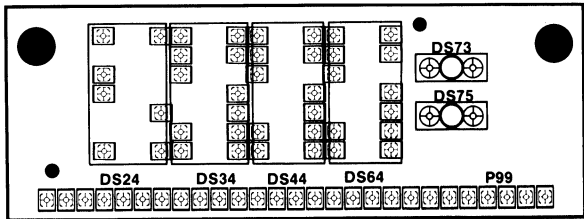
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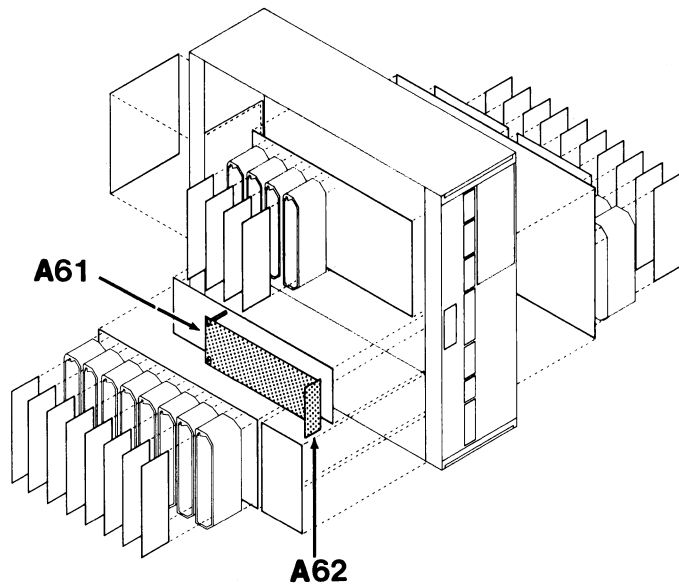
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A61 READOUT DRIVER BOARD

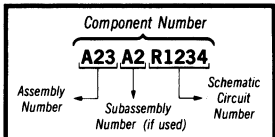


A62 READOUT BOARD




Static Sensitive Devices  
See Maintenance Section

COMPONENT NUMBER EXAMPLE



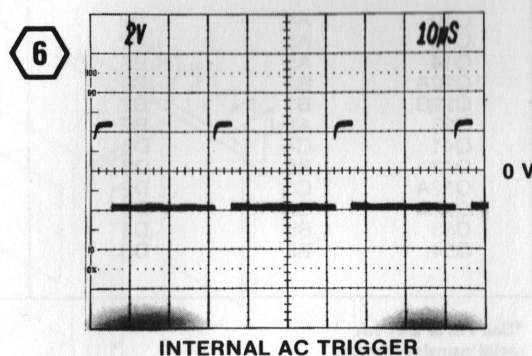
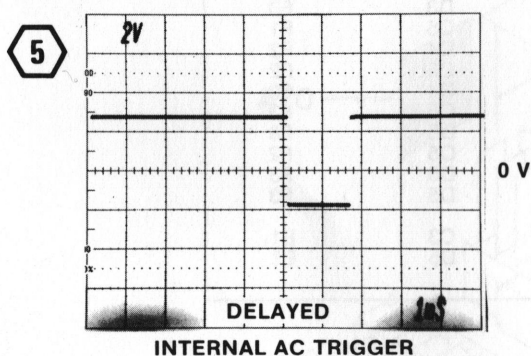
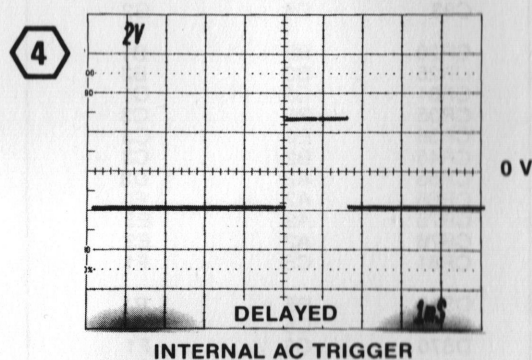
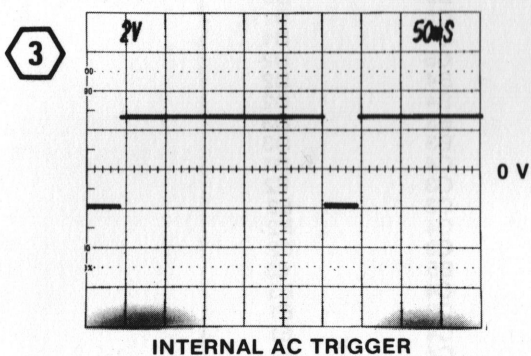
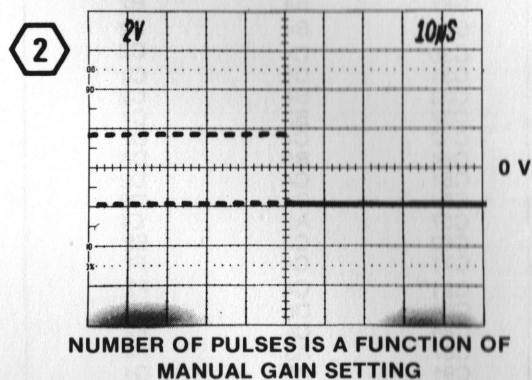
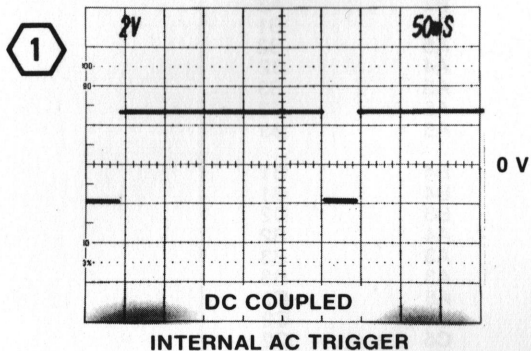
Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

Revised AUG 1988

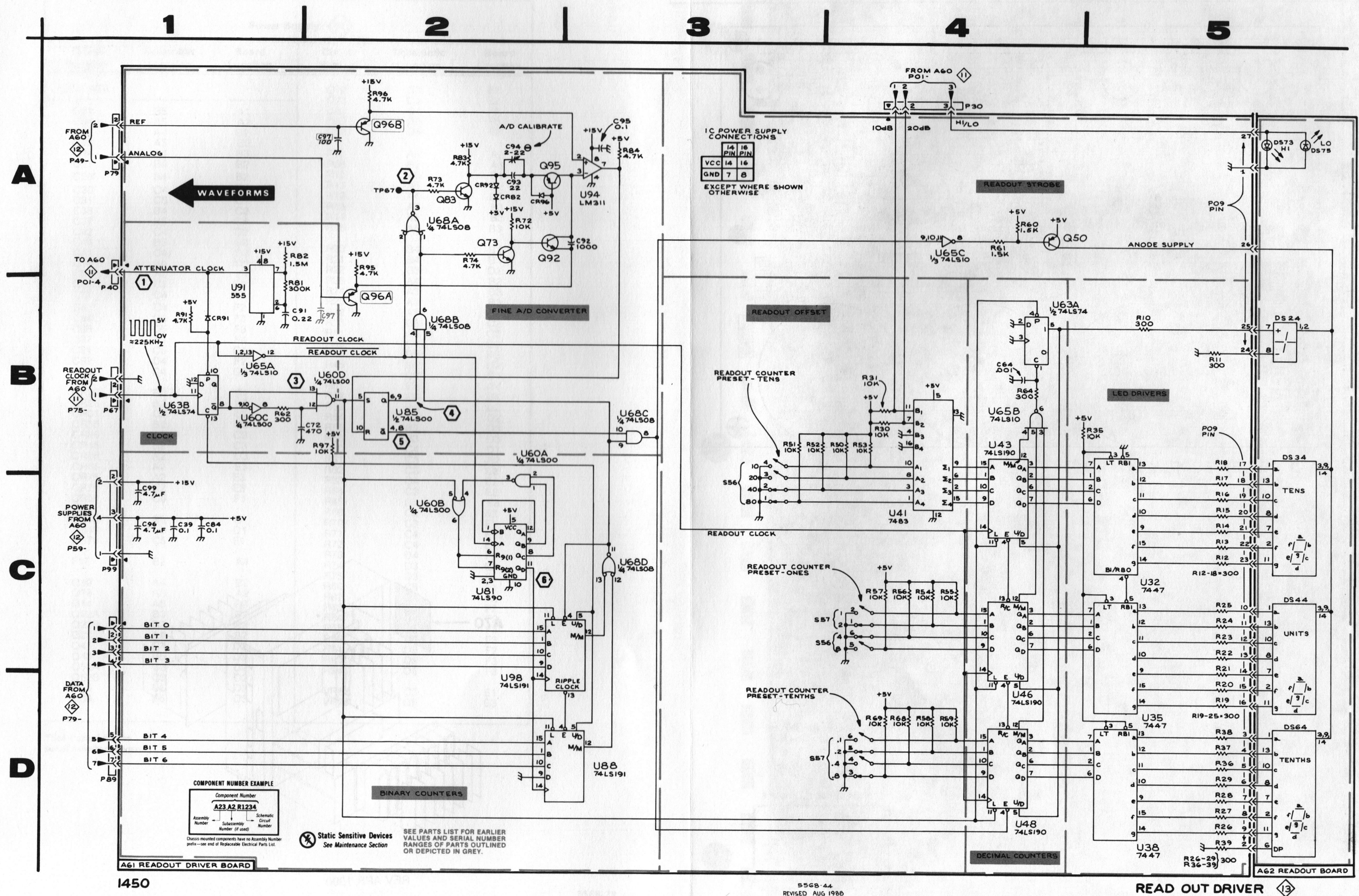
Read Out Driver 					
Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
<b>ASSY A61</b>			R58	D4	D3
C39	C1	B3	R59	D4	D3
C64	B4	E2	R60	A4	D1
C72	B2	E1	R61	A4	D1
C84	C1	F2	R62	B1	E1
C91	B1	G1	R64	B4	E2
C92	A3	G2	R68	D4	D3
C93	A2	G2	R69	D4	D3
C94	A2	G2	R72	A2	E1
C95	A3	G2	R73	A2	E2
C96	C1	G2	R74	A2	E2
<b>C97</b>	<b>A2</b>		R81	B1	F1
C99	C1	G3	R82	A1	F1
CR82	A2	F2	R83	A2	F2
CR91	B1	G1	R84	A3	F2
CR92	A2	G1	R91	B1	G1
CR96	A2	G3	R95	A2	F3
Q50	A4	D1	R96	A2	F3
Q73	A2	E2	R97	B2	G3
Q83	A2	F2	S56	C3,C4	D2
Q92	A2	G1	S57	C4,D4	D3
Q95	A2	G2	TP67	A2	E3
Q96A	A2	F3	U32	C5	B1
Q96B	B2	F3	U35	D5	B2
R10	B5	A1	U38	D5	B3
R11	B5	A1	U41	C4	C1
R12	C5	A1	U43	B4	C2
R13	C5	A1	U46	D4	C2
R14	C5	A1	U48	D4	C3
R15	C5	A2	U60A	B2	E1
R16	C5	A2	U60B	C2	E1
R17	C5	A2	U60C	B1	E1
R18	B5	A2	U60D	B2	E1
R21	C5	A2	U63A	B4	E2
R22	C5	A2	U63B	B1	E2
R23	C5	A2	U65A	B1	E2
R24	C5	A3	U65B	B4	E2
R25	C5	A3	U65C	A4	E2
R26	D5	A3	U68A	A2	E3
R27	D5	A3	U68B	B2	E3
R28	D5	A3	U68C	B3	E3
R29	D5	A3	U68D	C3	E3
R30	B4	C1	U81	C2	E1
R31	B4	B1	U85	B2	F2
R35	B5	B2	U88	D3	F3
R36	D5	A3	U91	B1	F1
R37	D5	A3	U94	A3	G2
R38	D5	A3	U98	C2	G3
R39	D5	A3	<b>ASSY A62</b>		
R50	B4	D1	DS24	B5	A5
R51	B3	D1	DS34	B5	B5
R52	B3	D1	DS44	C5	B5
R53	B4	D2	DS64	D5	C5
R54	C4	D2	DS73	A5	C5
R55	C4	D2			
R56	C4	D2			
R57	C4	D2			



13











Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.



## Power Supply

14

Circuit Number	Schematic Location	Board Location	Circuit Number	Schematic Location	Board Location
<b>ASSY A70</b>			Q72	C3	E2
C01	B5	A1	Q73	C3	E2
C04	A5	A3	Q81	D4	F2
C12	A4	B2	Q82	D5	F3
C13	A5	B3	Q83	D5	F3
C14	A4	B3	R02	A5	A2
C21	B4	B2	R06	B2	A3
C20*	B4	B2	R10	B5	B1
C30*	C4	C2	R11	A5	B2
C31	C5	C1	R12	A4	B2
C33	B4	C2	R13	A5	B3
C37	B3	C4	R14	A5	B3
C42	C4	D2	R15	A5	B3
C44	B5	D3	R20	B4	B1
C51	C4	D2	R21	B4	B1
C54	B4	D3	R22	B3	D2
C57	A3	E4	R23	A4	B2
C62	C3	E2	R24	A3	B3
C71	C4	F1	R25	A3	B3
C81*	C4	F2	R32	A5	C2
C84	D5	F3	R33	B5	C2
C85	D5	F3	R41	C5	C2
C87	A3	F4	R42	C4	D2
C91	C5	G1	R44	B5	D3
C92	D4	F2	R45	B5	D3
C93	D4	G2	R50	C5	D1
CR20	B5	B1	R51	C4	D1
CR25	B2	B3	R52	C5	D2
CR31	C5	C1	R53	B4	D2
CR35	B2	C3	R54	B4	D2
CR36	B2	C3	R55	B3	D3
CR45	B2	C3	R56	B3	D3
CR55	A2	D3	R60	C4	D1
CR65	A2	E3	R61	C3	E2
CR75	A2	E3	R62	C3	E2
CR76	A2	E3	R63	C4	E2
CR81	C5	F1	R64	C3	E2
DS10	B5	B1	R65	B5	E3
DS40	C5	D1	R66	C4	E3
DS70	C5	F1	R70	C3	E1
F17	B2	A4	R71	C4	E1
Q10	A4	B2	R72	C4	E1
Q13	A5	A2	R73	D4	F2
Q14	A5	B2	R74	D3	E3
Q22A	B3	B2	R75	D3	F3
Q22B	B3	B2	R80	C5	F1
Q23	A5	B2	R82	D4	F2
Q41	C4	D2	R83	D5	F2
Q43	B5	D3	R84	D4	F2
Q52A	C3	D2	R85	D5	F3
Q52B	C3	D2	R86	D5	F3
Q53	B5	D3	R91	D5	F2
Q54	B5	D3	R93	D5	F3
			R94	D5	F3
			VR62	C3	E1
			VR73	D5	E3

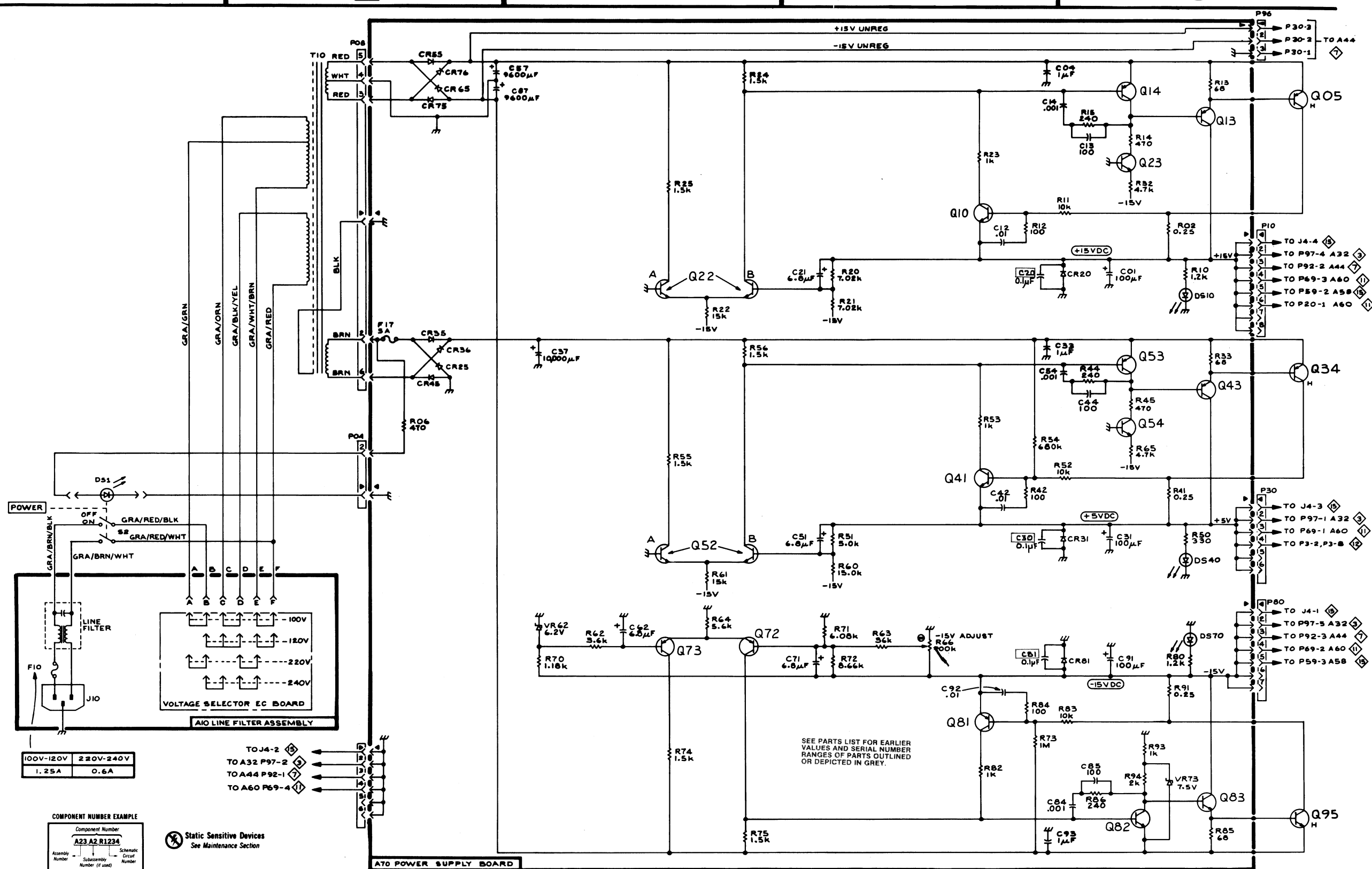
\*See Parts List for  
serial number ranges.

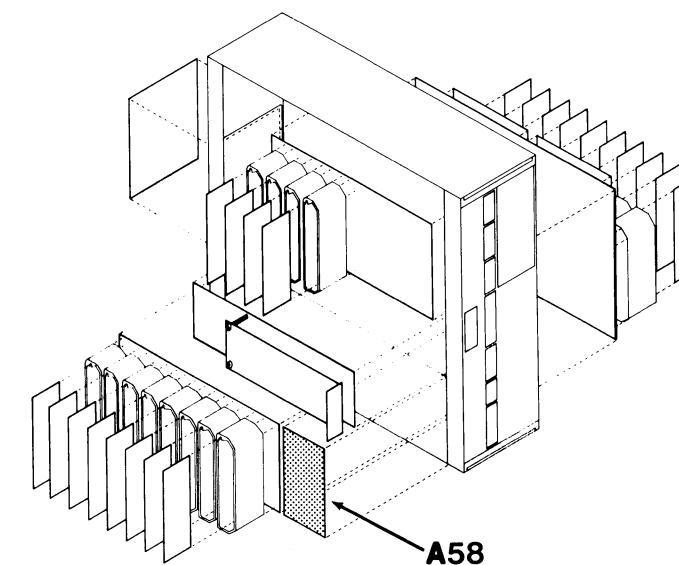
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B


C

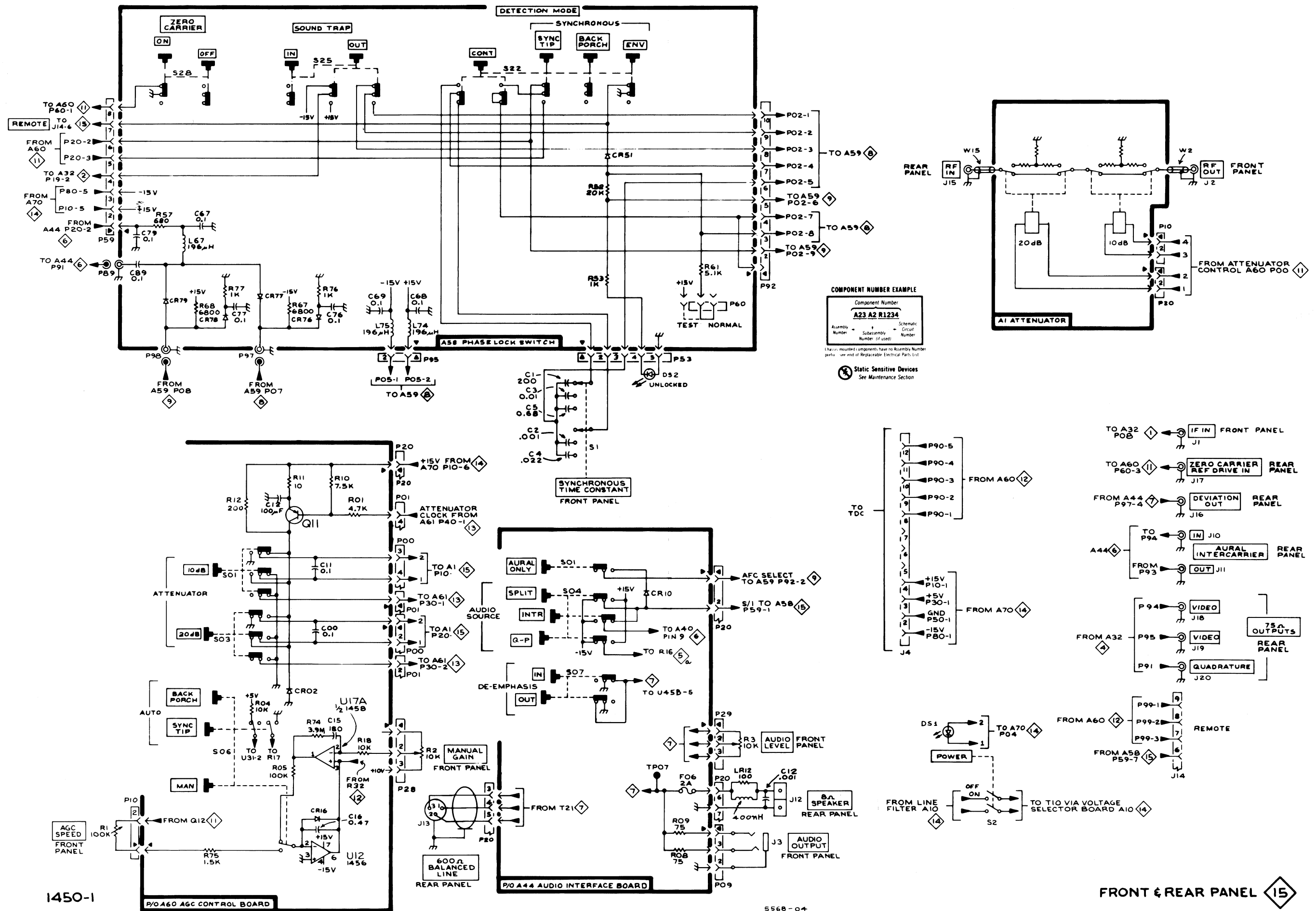
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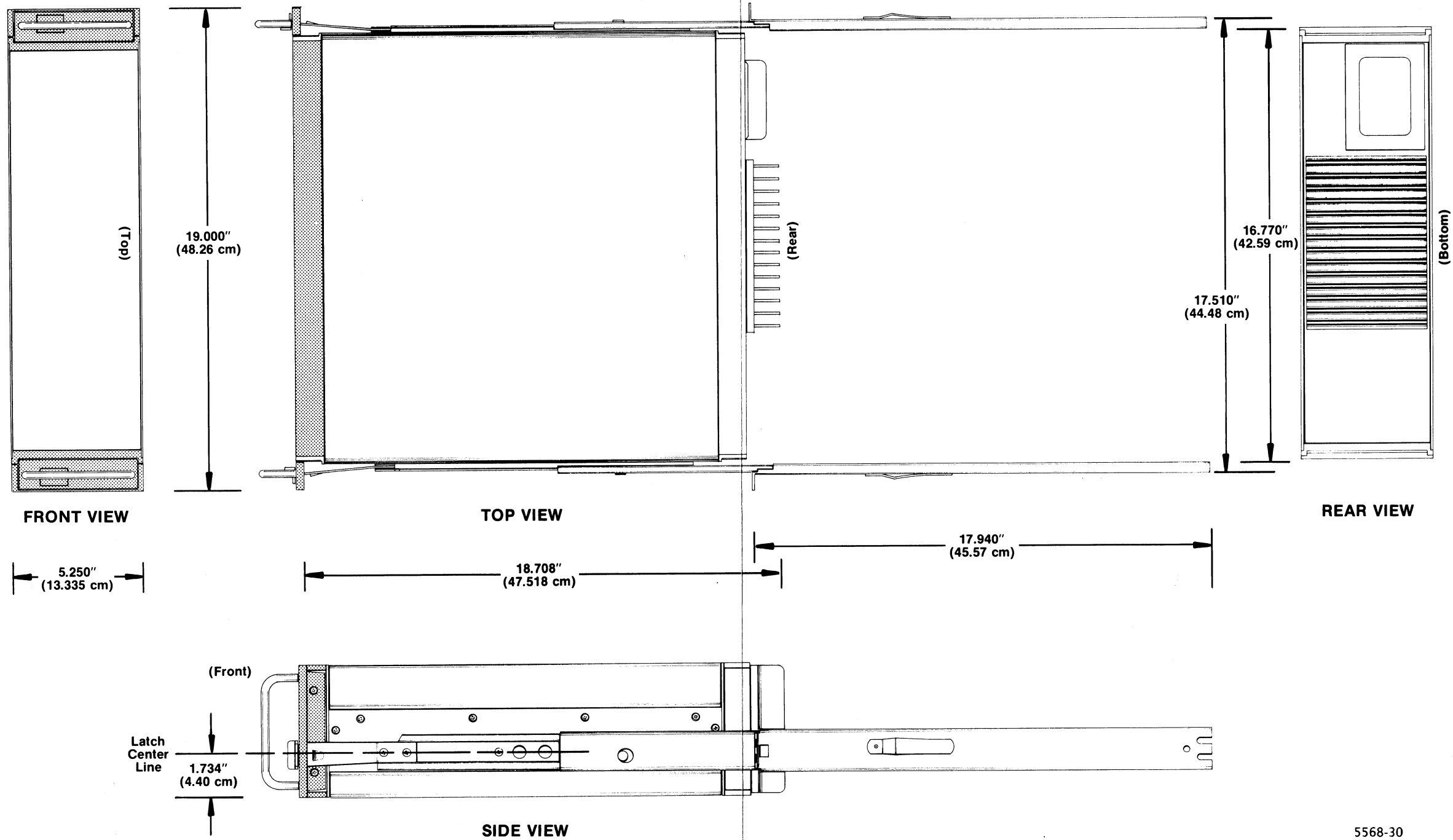




Chassis-mounted components have no Assembly Number prefix—see end of Replaceable Electrical Parts List.

Front & Rear Panel 		
Circuit Number	Schematic Location	Board Location
<b>ASSY A58</b>		
C67	A1	E2
C68	B2	F2
C69	B2	F2
C76	B2	D2
C77	B1	E2
C79	A1	F2
C89	B1	F1
CR51	A3	A2
CR76	B2	E1
CR77	B1	E1
CR78	B1	E1
CR79	B1	E2
L67	A1	E2
L74	B2	D1
L75	B2	D1
P60	B3	A2
P89	B1	F1
P97	B1	E1
P98	B1	E1
R52	A3	B2
R53	B3	B2
R57	A1	E2
R61	B3	A2
R67	B2	D2
R68	B1	E2
R76	B2	D2
R77	B1	E1
S22	A2	A2
S25	A2	D2
S28	A1	E2





# REPLACEABLE MECHANICAL PARTS

## PARTS ORDERING INFORMATION

Replacement parts are available from or through your local Tektronix, Inc. Field Office or representative.

Changes to Tektronix instruments are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest circuit improvements developed in our engineering department. It is therefore important, when ordering parts, to include the following information in your order: Part number, instrument type or number, serial number, and modification number if applicable.

If a part you have ordered has been replaced with a new or improved part, your local Tektronix, Inc. Field Office or representative will contact you concerning any change in part number.

Change information, if any, is located at the rear of this manual.

## ITEM NAME

In the Parts List, an Item Name is separated from the description by a colon (:). Because of space limitations, an Item Name may sometimes appear as incomplete. For further Item Name identification, the U.S. Federal Cataloging Handbook H6-1 can be utilized where possible.

## FIGURE AND INDEX NUMBERS

Items in this section are referenced by figure and index numbers to the illustrations.

## INDENTATION SYSTEM

This mechanical parts list is indented to indicate item relationships. Following is an example of the indentation system used in the description column

1	2	3	4	5	Name & Description
					<i>Assembly and/or Component</i>
					<i>Attaching parts for Assembly and/or Component</i>
					**** END ATTACHING PARTS ****
					<i>Detail Part of Assembly and/or Component</i>
					<i>Attaching parts for Detail Part</i>
					**** END ATTACHING PARTS ****
					<i>Parts of Detail Part</i>
					<i>Attaching parts for Parts of Detail Part</i>
					**** END ATTACHING PARTS ****

Attaching Parts always appear in the same indentation as the item it mounts, while the detail parts are indented to the right. Indented items are part of, and included with, the next higher indentation.

**Attaching parts must be purchased separately, unless otherwise specified.**

## ABBREVIATIONS

#	INCH	ELCTRN	ELECTRON	IN	INCH	SE	SINGLE END
ACTR	NUMBER SIZE	ELEC	ELECTRICAL	INCAND	INCANDESCENT	SECT	SECTION
ADPTR	ACTUATOR	ELCTLT	ELECTROLYTIC	INSUL	INSULATOR	SEMICON	SEMICONDUCTOR
ALIGN	ADAPTER	ELEM	ELEMENT	INTL	INTERNAL	SHLD	SHIELD
AL	ALIGNMENT	EPL	ELECTRICAL PARTS LIST	LPHLDR	LAMPHOLDER	SHLDR	SHOULDERED
ASSEM	ALUMINUM	EQPT	EQUIPMENT	MACH	MACHINE	SKT	SOCKET
ASSY	ASSEMBLED	EXT	EXTERNAL	MECH	MECHANICAL	SL	SLIDE
ATTEN	ASSEMBLY	FIL	FILLISTER HEAD	MTG	MOUNTING	SLFLKG	SELF-LOCKING
AWG	ATTENUATOR	FLEX	FLEXIBLE	NIP	NIPPLE	SLVG	SLEEVEING
BD	AMERICAN WIRE GAGE	FLH	FLAT HEAD	NON WIRE	NOT WIRE WOUND	SPR	SPRING
BRKT	BOARD	FLTR	FILTER	OBD	ORDER BY DESCRIPTION	SQ	SQUARE
BRS	BRACKET	FR	FRAME or FRONT	OD	OUTSIDE DIAMETER	SST	STAINLESS STEEL
BRZ	BRASS	FSTNR	FASTENER	OVH	OVAL HEAD	STL	STEEL
BSHG	BRONZE	FT	FOOT	PH BRZ	PHOSPHOR BRONZE	SW	SWITCH
CAB	BUSHING	FXD	FIXED	PL	PLAIN or PLATE	T	TUBE
CAP	CABINET	GSKT	GASKET	PLSTC	PLASTIC	TERM	TERMINAL
CER	CAPACITOR	HDL	HANDLE	PN	PART NUMBER	THD	THREAD
CHAS	CERAMIC	HEX	HEXAGON	PNH	PAN HEAD	THK	THICK
CKT	CHASSIS	HEX HD	HEXAGONAL HEAD	PWR	POWER	TNSN	TENSION
COMP	CIRCUIT	HEX SOC	HEXAGONAL SOCKET	RCPT	RECEPTACLE	TPG	TAPPING
CONN	COMPOSITION	HLCP	HELICAL COMPRESSION	RES	RESISTOR	TRH	TRUSS HEAD
COV	CONNECTOR	HLEXT	HELICAL EXTENSION	RGD	RIGID	V	VOLTAGE
CPLG	COVER	HV	HIGH VOLTAGE	RLF	RELIEF	VAR	VARIABLE
CRT	COUPLING	IC	INTEGRATED CIRCUIT	RTNR	RETAINER	W/	WITH
DEG	CATHODE RAY TUBE	ID	INSIDE DIAMETER	SCH	SOCKET HEAD	WSHR	WASHER
DWR	DEGREE	IDNT	IDENTIFICATION	SCOPE	OSCILLOSCOPE	XFMR	TRANSFORMER
	DRAWER	IMPLR	IMPELLER	SCR	SCREW	XSTR	TRANSISTOR



## CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
00779	AMP INC	2800 FULLING MILL PO BOX 3608	HARRISBURG PA 17105
01536	TEXTRON INC CAMCAR DIV SEMS PRODUCTS UNIT	1818 CHRISTINA ST	ROCKFORD IL 61108
05820	EG AND G WAKEFIELD ENGINEERING	60 AUDUBON RD	WAKEFIELD MA 01880-1203
06383	PANDUIT CORP	17301 RIDGELAND	TINLEY PARK IL 07094-2917
06666	GENERAL DEVICES CO INC	1410 S POST RD PO BOX 39100	INDIANAPOLIS IN 46239-9632
06915	RICHCO PLASTIC CO	5825 N TRIPP AVE	CHICAGO IL 60646-6013
06950	SCREWCORP VSI AEROSPACE PRODUCTS DIV SUB OF FAIRCHILD INDUSTRIES INC	13001 E TEMPLE AVE PO BOX 730	CITY OF INDUSTRY CA 91746-1417
07707	USM CORP SUB OF EMHART INDUSTRIES INC USM FASTENER DIV	510 RIVER RD	SHELTON CT 06848-4517
08261	SPECTRA-STRIP AN ELTRA CO	7100 LAMPSON AVE	GARDEN GROVE CA 92642
09772	WEST COAST LOCKWASHER CO INC	16730 E JOHNSON DRIVE P O BOX 3588	CITY OF INDUSTRY CA 91744
09922	BURNDY CORP	RICHARDS AVE	NORWALK CT 06852
11897	PLASTIGLIDE MFG CORP	2701 W EL SEGUNDO BLVD	HAWTHORNE CA 90250-3318
12300	POTTER AND BRUMFIELD DIV AMF CANADA LTD	52 ROYAL RD PO BOX 3620	GUELPH ONT CAN N1H 7H1
12327	FREEMAN CORP	9301 ALLEN DR	CLEVELAND OH 44125-4632
14566	COORS PORCELAIN CO SUB OF ADOLPH COORS CO	600 9TH ST	GOLDEN CO 80401-1050
14890	INDUSTRIAL GASKET INC	8100 SE 15TH ST PO BOX 24048	OKLAHOMA CITY OK 73124
18565	CHOMERICS INC	77 DRAGON COURT	WOBURN MA 01801-1039
22526	DU PONT E I DE NEMOURS AND CO INC DU PONT ELECTRONICS DEPT	515 FISHING CREEK RD	NEW CUMBERLAND PA 17070-3007
24931	SPECIALTY CONNECTOR CO INC	2100 EARLYWOOD DR PO BOX 547	FRANKLIN IN 46131
26742	METHODE ELECTRONICS INC	7447 W WILSON AVE	CHICAGO IL 60656-4548
31781	EDAC INC	20 RAILSIDE RD	DON MILLS ONT CAN M3A 1A4
32436	SYSCON INTERNATIONAL INC	1701 S MAIN ST	SOUTH BEND IN 46613-2211
55285	BERGQUIST CO INC THE	5300 EDINA INDUSTRIAL BLVD	MINNEAPOLIS MN 55435-3707
70903	COOPER BELDEN ELECTRONICS WIRE AND C SUB OF COOPER INDUSTRIES INC		
71468	ITT CANNON DIV OF ITT CORP	666 E DYER RD	SANTA ANA CA 92702
71785	CINCH CONNECTORS	1501 MORSE AVE	ELK GROVE VILLAGE IL 60007-5723
73743	FISCHER SPECIAL MFG CO	111 INDUSTRIAL RD	COLD SPRING KY 41076-9749
75915	LITTELFUSE INC SUB TRACOR INC	800 E NORTHWEST HWY	DES PLAINES IL 60016-3049
77900	ILLINOIS TOOL WORKS SHAKEPROOF DIV	ST CHARLES RD	ELGIN IL 60120
78189	ILLINOIS TOOL WORKS INC SHAKEPROOF DIV	ST CHARLES ROAD	ELGIN IL 60120
80009	TEKTRONIX INC	14150 SW KARL BRAUN DR PO BOX 500	BEAVERTON OR 97077-0001
82389	SWITCHCRAFT INC SUB OF RAYTHEON CO	5555 N ELSTON AVE	CHICAGO IL 60630-1314
83309	ELECTRICAL SPECIALITY CO SUB OF BELDEN CORP	345 SWIFT AVE	SOUTH SAN FRANCISCO CA 94080-6206
83385	MICRODOT MFG INC GREER-CENTRAL DIV	3221 W BIG BEAVER RD	TROY MI 48098
83486	ELCO INDUSTRIES INC	1101 SAMUELSON RD	ROCKFORD IL 61101
83553	ASSOCIATED SPRING BARNES GROUP INC	15001 S BROADWAY P O BOX 231	GARDENA CA 90248-1819
86928	SEASTROM MFG CO INC	701 SONORA AVE	GLENDALE CA 91201-2431
91500	ASHEVILLE-SCHOONMAKER MICA CO	910 JEFFERSON AVE P O BOX 318	NEWPORT NEWS VA 23607-6120
91506	AUGAT INC	33 PERRY AVE P O BOX 779	ATTLEBORO MA 02703-2417

## CROSS INDEX - MFR. CODE NUMBER TO MANUFACTURER

Mfr. Code	Manufacturer	Address	City, State, Zip Code
93907	TEXTRON INC CAMCAR DIV	600 18TH AVE	ROCKFORD IL 61108-5181
95987	BRADY/WECKESSER MFG CO	4444 WEST IRVING PARK RD	CHICAGO IL 60641
TK0392	NORTHWEST FASTENER SALES INC	7923 SW CIRRHUS DRIVE	BEAVERTON OR 97005-6448
TK0433	PORTLAND SCREW CO	6520 N BASIN	PORTLAND OR 97217-3920
TK0435	LEWIS SCREW CO	4300 S RACINE AVE	CHICAGO IL 60609-3320
TK0858	STAUFFER SUPPLY CO (DIST)		
TK1099	INSTRUMENT SPECIALTIES CO	BOX A 1	DELAWARE WATERGAP PA 18327
TK1319	MORELLIS Q & D PLASTICS		
TK1373	PATELEC-CEM (ITALY)	10156 TORINO	VAICENTALLO 62/45S ITALY
TK1375	ESAM		
TK1483	TEKA PRODUCTS		
TK1617	CRAFT FACTORY PLASTICS	17145 SW ALEXANDER	ALOHA OR 97007
TK2278	COMTEK MANUFACTURING OF OREGON (METALS)		

## REPLACEABLE MECHANICAL PARTS - 1450-1

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-1	390-0585-00		1	CABINET TOP:	80009	390-0585-00
	214-0603-02		6	.PIN ASSY,SECRG:W/SPRING WASHER	TK2278	ORDER BY DESCR
-2	214-0603-01		6	.PIN,SECURING:0.45 DIA X 0.27,ZAMAK CD PL	80009	214-0603-01
-3	214-0604-00		6	.WASHER,SPR TNSN:0.26 ID X 0.47 OD X 0.01 TH .K,SST	80009	214-0604-00
-4	386-0227-04		6	.STOP,CLP,RIM CL:	80009	386-0227-04
-5	386-1151-00		6	.CLAMP,RIM CLENC:SPG STL CD PL	83553	ORDER BY DESCR
-6	390-0586-00		1	CABINET BOTTOM:	80009	390-0586-00
	214-0603-02		6	.PIN ASSY,SECRG:W/SPRING WASHER	TK2278	ORDER BY DESCR
-7	214-0603-01		6	.PIN,SECURING:0.45 DIA X 0.27,ZAMAK CD PL	80009	214-0603-01
-8	214-0604-00		6	.WASHER,SPR TNSN:0.26 ID X 0.47 OD X 0.01 TH .K,SST	80009	214-0604-00
-9	386-0227-04		6	.STOP,CLP,RIM CL:	80009	386-0227-04
-10	386-1151-00		6	.CLAMP,RIM CLENC:SPG STL CD PL	83553	ORDER BY DESCR
-11	366-1024-00		2	KNOB:GY,0.252 ID X 0.706 OD X 0.6 H	80009	366-1024-00
	213-0153-00		4	.SETSCREW:5-40 X 0.125,STL	TK0392	ORDER BY DESCR
-12	426-0681-00		19	FRAME,PUSH BTN:	80009	426-0681-00
-13	366-0497-00		2	KNOB:GY,0.127 ID X 0.706 OD X 0.6 H	80009	366-0497-00
	213-0153-00		2	.SETSCREW:5-40 X 0.125,STL	TK0392	ORDER BY DESCR
-14	426-0916-00		1	FRAME,ROUT WDO:	80009	426-0916-00
-15	331-0314-00		1	WINDOW,READOUT:	80009	331-0314-00
-16	131-1315-01		8	CONN,RF JACK:	80009	131-1315-01
-17	352-0451-00		3	HOLDER,LENS:0.125 ID,RUBBER	TK1617	ORDER BY DESCR
-18	-----		1	SWITCH,ROTARY:(SEE S1 REPL) (ATTACHING PARTS)		
-19	210-0978-00		1	WASHER,FLAT:0.375 ID X 0.5 OD X 0.024,STL	12327	ORDER BY DESCR
-20	210-0590-00		1	NUT,PLAIN,HEX:0.375-32 X 0.438 BRS CD PL (END ATTACHING PARTS)	73743	28269-402
-21	-----		1	SWITCH,TOGGLE:(SEE S2 REPL) (ATTACHING PARTS)		
-22	210-0473-01		1	NUT,PLAIN,DODEC:0.469-32 X 0.638,BRS BK CRM PL	80009	210-0473-01
-23	210-0902-01		1	WASHER,FLAT:0.47 ID X 0.656 OD X 0.03,STL	80009	210-0902-01
-24	354-0055-00		1	WASHER,KEY:0.468 ID X 0.718 OD,STL CD PL	80009	354-0055-00
-25	210-0241-00		1	TERMINAL,LUG:0.515 ID,PLAIN,STL CD PL (END ATTACHING PARTS)	80009	210-0241-00
-26	-----		1	RES.,VAR:100K OHM (SEE R1 REPL) (ATTACHING PARTS)		
-27	210-0583-00		1	NUT,PLAIN,HEX:0.25-32 X 0.312,BRS CD PL	73743	2X-20319-402
-28	210-0940-00		1	WASHER,FLAT:0.25 ID X 0.375 OD X 0.02,STL (END ATTACHING PARTS)	12327	ORDER BY DESCR
-29	-----		1	CKT BOARD ASSY:A.G.C. READOUT (SEE A62 REPL) (ATTACHING PARTS)		
-30	220-0413-00		2	NUT,SLEEVE:4-40 X 0.562 HEX,BRS CD PL (END ATTACHING PARTS) CKT BOARD ASSY INCLUDES:	80009	220-0413-00
-31	131-0589-00		27	.TERMINAL,PIN:	80009	131-0589-00
-32	361-0411-00		2	.SPACER,PUSH SW:0.109 L,BLUE POLYCARBONATE	80009	361-0411-00
-33	-----		1	RES.,VAR:10K OHM (SEE R2 REPL) (ATTACHING PARTS)		
-34	210-0583-00		1	NUT,PLAIN,HEX:0.25-32 X 0.312,BRS CD PL	73743	2X-20319-402
-35	210-0940-00		1	WASHER,FLAT:0.25 ID X 0.375 OD X 0.02,STL (END ATTACHING PARTS)	12327	ORDER BY DESCR
-36	175-2079-00		1	CABLE ASSY,RF:50 OHM COAX,16.0 L	80009	175-2079-00
-37	-----		1	RES.,VAR:10K OHM (SEE R3 REPL) (ATTACHING PARTS)		
-38	210-0590-00		1	NUT,PLAIN,HEX:0.375-32 X 0.438 BRS CD PL	73743	28269-402
-39	210-0978-00		1	WASHER,FLAT:0.375 ID X 0.5 OD X 0.024,STL (END ATTACHING PARTS)	12327	ORDER BY DESCR
-40	131-0267-00		1	JACK,TELEPHONE:3 CONDUCTOR,PANEL MOUNT	82389	12B
-41	210-0012-00		1	WASHER,LOCK:0.384 ID,INTL,0.022 THK,STL	09772	ORDER BY DESCR
-42	333-2584-00		1	PANEL,FRONT:	80009	333-2584-00
-43	351-0104-03		1	SL SECT,DWR EXT:12.625 L,W/O HARDWARE (ATTACHING PARTS)	06666	C-720-3
-44	212-0008-00		4	SCREW,MACHINE:8-32 X 0.5,PNH,STL (END ATTACHING PARTS)	83385	ORDER BY DESCR
-45	426-1406-00		1	FRAME SECT,CAB.:LEFT	80009	426-1406-00

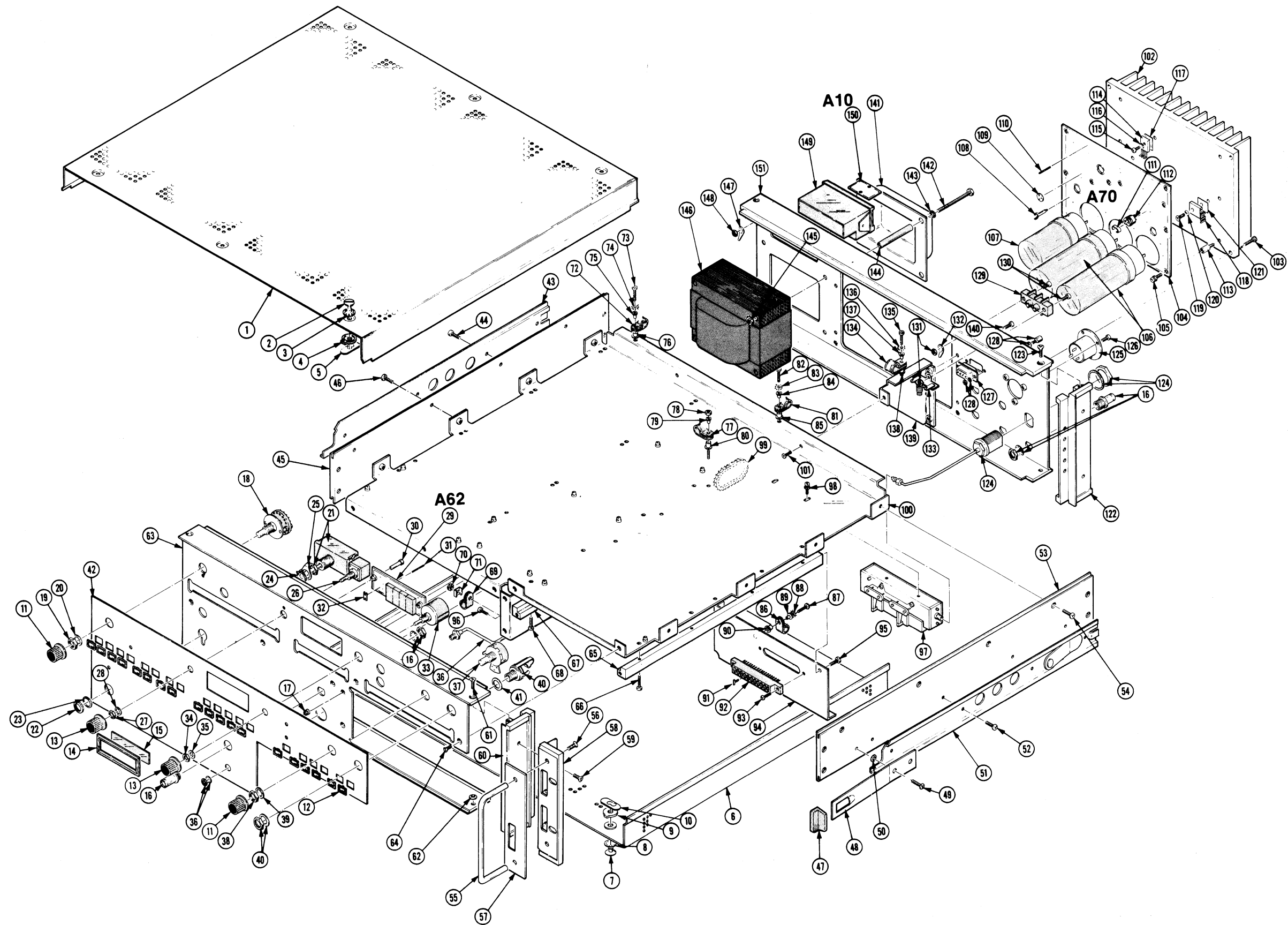
Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
1-				(ATTACHING PARTS)		
-46	211-0507-00		4	SCREW,MACHINE:6-32 X 0.312,PNH,STL (END ATTACHING PARTS)	83385	ORDER BY DESCR
-47	366-1729-00		2	KNOB:GY,1.115 X 0.343 X 0.6	TK1319	N/A
-48	214-2558-00		2	SPRING,FLAT:CHASSIS TRACK LOCK (ATTACHING PARTS)	80009	214-2558-00
-49	212-0008-00		4	SCREW,MACHINE:8-32 X 0.5,PNH,STL	83385	ORDER BY DESCR
-50	210-1266-00		4	WASHER,FLAT:0.193 ID X 0.475 OD X 0.075,STL (END ATTACHING PARTS)	86928	5702-79-75C
-51	351-0104-03		1	SL SECT,DWR EXT:12.625 L,W/O HARDWARE (ATTACHING PARTS)	06666	C-720-3
-52	212-0142-00		6	SCREW,MACHINE:8-32 X 0.437,PNH STL (END ATTACHING PARTS)	83486	ORDER BY DESCR
-53	426-1407-00		1	FRAME SECT,CAB.:RIGHT (ATTACHING PARTS)	80009	426-1407-00
-54	211-0507-00		4	SCREW,MACHINE:6-32 X 0.312,PNH,STL (END ATTACHING PARTS)	83385	ORDER BY DESCR
-55	367-0104-00		2	HANDLE,BOW:4.076 L,AL CRPL (ATTACHING PARTS)	80009	367-0104-00
-56	212-0574-00		8	SCREW,MACHINE:10-32 X 0.438,FLH,100 DEG,STL (END ATTACHING PARTS)	83385	ORDER BY DESCR
-57	386-3723-00		2	PLATE,TRIM:FRONT	80009	386-3723-00
-58	407-0570-04		2	BRACKET,ANGLE:FRONT,RIGHT & LEFT,AL (ATTACHING PARTS)	80009	407-0570-04
-59	212-0043-00		4	SCREW,MACHINE:8-32 X 0.5,FLH,100 DEG,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-60	426-0482-09		2	FRAME SECT,CAB.:UPRIGHT,REAR CORNER (ATTACHING PARTS)	80009	426-0482-09
-61	212-0506-00		4	SCREW,MACHINE:10-32 X 0.375,FLH,100 DEG,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-62	210-0804-00		1	WASHER,FLAT:0.17 ID X 0.375 OD X 0.032	86928	76430-000
-63	386-3721-00		1	SUBPANEL,FRONT: (ATTACHING PARTS)	80009	386-3721-00
-64	211-0025-00		7	SCREW,MACHINE:4-40 X 0.375,FLH,100 DEG,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-65	351-0534-00		1	SLIDE,GUIDE:PLUG-IN,RIGHT (ATTACHING PARTS)	80009	351-0534-00
-66	211-0164-00		4	SCREW,CAP:4-40 X 0.625,SCH,STL,CD PL,HEX RE C (END ATTACHING PARTS)	TK0433	ORDER BY DESCR
-67	351-0539-00		1	SLIDE,GUIDE:PLUG-IN,LEFT (ATTACHING PARTS)	80009	351-0539-00
-68	211-0164-00		4	SCREW,CAP:4-40 X 0.625,SCH,STL,CD PL,HEX RE C (END ATTACHING PARTS)	TK0433	ORDER BY DESCR
-69	343-0001-00		2	CLAMP,LOOP:0.125 ID,PLASTIC (ATTACHING PARTS)	06915	E2 CLEAR
-70	210-0457-00		2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	78189	511-061800-00
-71	210-0863-00		2	WSHR,LOOP CLAMP:0.091 ID U/W 0.5 W CLP,STL CD PL (END ATTACHING PARTS)	95987	C191
-72	343-0013-00		2	CLAMP,LOOP:0.375 ID,PLASTIC (ATTACHING PARTS)	06915	ORDER BY DESCR
-73	211-0511-00		2	SCREW,MACHINE:6-32 X 0.5,PNH,STL	TK0435	ORDER BY DESCR
-74	210-0005-00		2	WASHER,LOCK:#6 EXT,0.02 THK,STL	78189	1106-00
-75	210-0778-01		2	EYELET,METALLIC:0.163 OD X 0.145 L,BRS GOLD PL	80009	210-0778-01
-76	210-0601-01		2	EYELET,METALLIC:0.183 OD X 0.192 L,BRS CD P L (END ATTACHING PARTS)	80009	210-0601-01
-77	343-0005-00		2	CLAMP,LOOP:0.437 ID,PLASTIC (ATTACHING PARTS)	06915	E7 CLEAR ROUND
-78	210-0457-00		2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	78189	511-061800-00
-79	210-0778-01		2	EYELET,METALLIC:0.163 OD X 0.145 L,BRS GOLD PL	80009	210-0778-01
-80	210-0601-01		2	EYELET,METALLIC:0.183 OD X 0.192 L,BRS CD P L (END ATTACHING PARTS)	80009	210-0601-01

## REPLACEABLE MECHANICAL PARTS - 1450-1

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
1-81	343-0007-00		1		CLAMP, LOOP: 0.625 ID, PLASTIC (ATTACHING PARTS)	06915	ORDER BY DESCR
-82	211-0511-00		1		SCREW, MACHINE: 6-32 X 0.5, PNH, STL	TK0435	ORDER BY DESCR
-83	210-0005-00		1		WASHER, LOCK: #6 EXT, 0.02 THK, STL	78189	1106-00
-84	210-0778-01		1		EYELET, METALLIC: 0.163 OD X 0.145 L, BRS GOLD PL	80009	210-0778-01
-85	210-0601-01		1		EYELET, METALLIC: 0.183 OD X 0.192 L, BRS CD P L (END ATTACHING PARTS)	80009	210-0601-01
-86	343-0002-00		1		CLAMP, LOOP: 0.187 ID, PLASTIC (ATTACHING PARTS)	06915	E3 CLEAR ROUND
-87	211-0511-00		1		SCREW, MACHINE: 6-32 X 0.5, PNH, STL	TK0435	ORDER BY DESCR
-88	210-0005-00		1		WASHER, LOCK: #6 EXT, 0.02 THK, STL	78189	1106-00
-89	210-0778-01		1		EYELET, METALLIC: 0.163 OD X 0.145 L, BRS GOLD PL	80009	210-0778-01
-90	210-0601-01		1		EYELET, METALLIC: 0.183 OD X 0.192 L, BRS CD P L (END ATTACHING PARTS)	80009	210-0601-01
-91	214-2836-00		1		KEY, CONN PLZN: WHITE NYLON	26742	116-1056-00
-92	131-0934-00		1		CONN, EDGE CARD: : (ATTACHING PARTS)	31781	307-024-500-302
-93	211-0014-00		2		SCREW, MACHINE: 4-40 X 0.5, PNH, STL (END ATTACHING PARTS)	93907	ORDER BY DESCR
-94	407-2015-00		1		BRACKET, CONN: D.C., ALUMINUM (ATTACHING PARTS)	80009	407-2015-00
-95	212-0004-00		2		SCREW, MACHINE: 8-32 X 0.312, PNH, STL	TK0435	ORDER BY DESCR
-96	211-0008-00		2		SCREW, MACHINE: 4-40 X 0.25, PNH, STL (END ATTACHING PARTS)	93907	ORDER BY DESCR
-97	-----		1		SWITCH, ATTENUATOR: (SEE A1 REPL) (ATTACHING PARTS)		
-98	211-0661-00		2		SCR, ASSEM WSHR: 4-40 X 0.25, PNH, STL, POZ (END ATTACHING PARTS)	01536	821-01655-024
-99	255-0334-00		AR		PLASTIC CHANNEL: 12.75 X 0.175 X 0.155, NYLON	11897	122-37-2500
-100	426-1408-00		1		FRAME SECT, CAB.: CENTER (ATTACHING PARTS)	80009	426-1408-00
-101	211-0507-00		2		SCREW, MACHINE: 6-32 X 0.312, PNH, STL (END ATTACHING PARTS)	83385	ORDER BY DESCR
-102	214-2540-02		1		HEAT SINK, ELEC: POWER SUPPLY, AL (ATTACHING PARTS)	80009	214-2540-02
-103	211-0640-00		4		SCREW, CAP: 6-32 X 0.625, SCH, STL, BD OXD, HEX R EC (END ATTACHING PARTS)	TK0433	ORDER BY DESCR
-104	-----		1		CKT BOARD ASSY: POWER SUPPLY (SEE A70 REPL) (ATTACHING PARTS)		
-105	211-0116-00		8		SCR, ASSEM WSHR: 4-40 X 0.312, PNH, BRS, NP, POZ (END ATTACHING PARTS)	77900	ORDER BY DESCR
-106	-----		2		CKT BOARD ASSY INCLUDES: .CAP., FXD, ELCTLT: (SEE A70C87, A70C57 REPL)		
-107	-----		1		.CAP., FXD, ELCTLT: (SEE A70C37 REPL)		
-108	344-0286-00		2		.CLIP, ELECTRICAL: FUSE, SPR BRS	75915	102074
-109	214-0817-00		2		.HEAT SINK, XSTR: TO-5, BE OXD	14566	A11193-T05
-110	131-0589-00		38		.TERMINAL, PIN:	80009	131-0589-00
-111	214-0973-00		1		.HEAT SINK, XSTR: TO-92, CU BE CD PL	80009	214-0973-00
-112	136-0235-00		3		.SKT, PL-IN ELEK: TRANSISTOR, 6 CONTACT, PCB MT	71785	133-96-12-062
-113	129-0762-00		8		SPACER, POST: 0.375 L, 4-40 INT/6-32 EXT, STL, 0 .188 HEX	80009	129-0762-00
-114	-----		2		TRANSISTOR: (SEE Q05, Q34 REPL) (ATTACHING PARTS)		
-115	211-0008-00		2		SCREW, MACHINE: 4-40 X 0.25, PNH, STL	93907	ORDER BY DESCR
-116	210-1122-00		2		WASHER, LOCK: 0.12 ID, DISHED, 0.025 THK, STL (END ATTACHING PARTS)	86928	ORDER BY DESCR
-117	342-0163-00		2		INSULATOR, PLATE: TRANSISTOR, MICA	80009	342-0163-00
-118	-----		1		TRANSISTOR: (SEE Q95 REPL) (ATTACHING PARTS)		
-119	211-0008-00		1		SCREW, MACHINE: 4-40 X 0.25, PNH, STL	93907	ORDER BY DESCR
-120	210-1122-00		1		WASHER, LOCK: 0.12 ID, DISHED, 0.025 THK, STL (END ATTACHING PARTS)	86928	ORDER BY DESCR
-121	342-0163-00		1		INSULATOR, PLATE: TRANSISTOR, MICA	80009	342-0163-00

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective    Dscont	Qty	12345    Name & Description	Mfr. Code	Mfr. Part No.
1-122	426-0482-09		2	FRAME SECT,CAB.:UPRIGHT,REAR CORNER (ATTACHING PARTS)	80009	426-0482-09
-123	212-0043-00		4	SCREW,MACHINE:8-32 X 0.5,FLH,100 DEG,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-124	175-2078-00		1	CABLE ASSY,RF:50 OHM COAX,6.0 L	80009	175-2078-00
-125	131-0014-00		1	CONN,RCPT,ELEC:MALE,3 CONTACT (ATTACHING PARTS)	82389	C3M
-126	211-0012-00		3	SCREW,MACHINE:4-40 X 0.375,PNH,STL (END ATTACHING PARTS)	93907	ORDER BY DESCR
-127	131-1006-00		1	CONN,D-SUB::SLDR CUP/PNL,;FEMALE,STR,9 POS, 0.112 CTR,0.120 MTG HOLE,ACCOM 20 AWG;,, (ATTACHING PARTS)	00779	747905-5
-128	131-0890-00		2	LOCK,CONNECTOR:4-40 X 0.312 L HEX HD,STL (END ATTACHING PARTS)	71468	D 20418-2
-129	124-0342-00		1	TERMINAL BOARD:2 CONTACTS (ATTACHING PARTS)	80009	124-0342-00
-130	211-0514-00		2	SCREW,MACHINE:6-32 X 0.750,PNH,STL	93907	B20-70350
-131	210-0457-00		2	NUT,PL,ASSEM WA:6-32 X 0.312,STL CD PL	78189	511-061800-00
-132	210-0202-00		1	TERMINAL,LUG:0.146 ID,LOCKING,BRZ TIN PL (END ATTACHING PARTS)	86928	A-373-158-2
-133	131-1023-00		1	CONTACT,ELEC:CENTER,BRASS,GOLD PL	80009	131-1023-00
-134	343-0013-00		2	CLAMP,LOOP:0.375 ID,PLASTIC (ATTACHING PARTS)	06915	ORDER BY DESCR
-135	211-0511-00		2	SCREW,MACHINE:6-32 X 0.5,PNH,STL	TK0435	ORDER BY DESCR
-136	210-0005-00		2	WASHER,LOCK:#6 EXT,0.02 THK,STL	78189	1106-00
-137	210-0778-01		2	EYELET,METALLIC:0.163 OD X 0.145 L,BRS GOLD PL	80009	210-0778-01
-138	210-0601-01		2	EYELET,METALLIC:0.183 OD X 0.192 L,BRS CD P L (END ATTACHING PARTS)	80009	210-0601-01
-139	407-2016-00		2	BRACKET,XFMR:GROUNDING,ALUMINUM (ATTACHING PARTS)	80009	407-2016-00
-140	211-0507-00		2	SCREW,MACHINE:6-32 X 0.312,PNH,STL (END ATTACHING PARTS)	83385	ORDER BY DESCR
-141	200-0772-05		1	COVER,ELEC XFMR: (ATTACHING PARTS)	80009	200-0772-05
-142	212-0515-00		4	SCREW,MACHINE:10-32 X 2.25,HEX HD,STL	93907	ORDER BY DESCR
-143	210-0812-00		4	WASHER,FLAT:0.188 ID X 0.375 OD X 0.31	83309	ORDER BY DESCR
-144	166-0457-00		4	INSUL SLVG,ELEC:0.19 ID X 1.875 L,MYLAR	80009	166-0457-00
-145	220-0410-00		8	NUT,PL,ASSEM WA:10-32 X 0.375 HEX,STL CD PL (END ATTACHING PARTS)	78189	511-101800-50
-146	-----		1	TRANSFORMER:(SEE T10 REPL)		
-147	210-0202-00		2	TERMINAL,LUG:0.146 ID,LOCKING,BRZ TIN PL (ATTACHING PARTS)	86928	A-373-158-2
-148	210-0407-00		2	NUT,PLAIN,HEX:6-32 X 0.25,BRS CD PL (END ATTACHING PARTS)	73743	3038-402
-149	-----		1	SELECTOR,VOLTS:(SEE P10 REPL)		
-150	-----		1	.CKT BOARD ASSY:VOLTAGE SELECTION (SEE A10 REPL)		
-151	333-2317-00		1	PANEL,REAR:	80009	333-2317-00







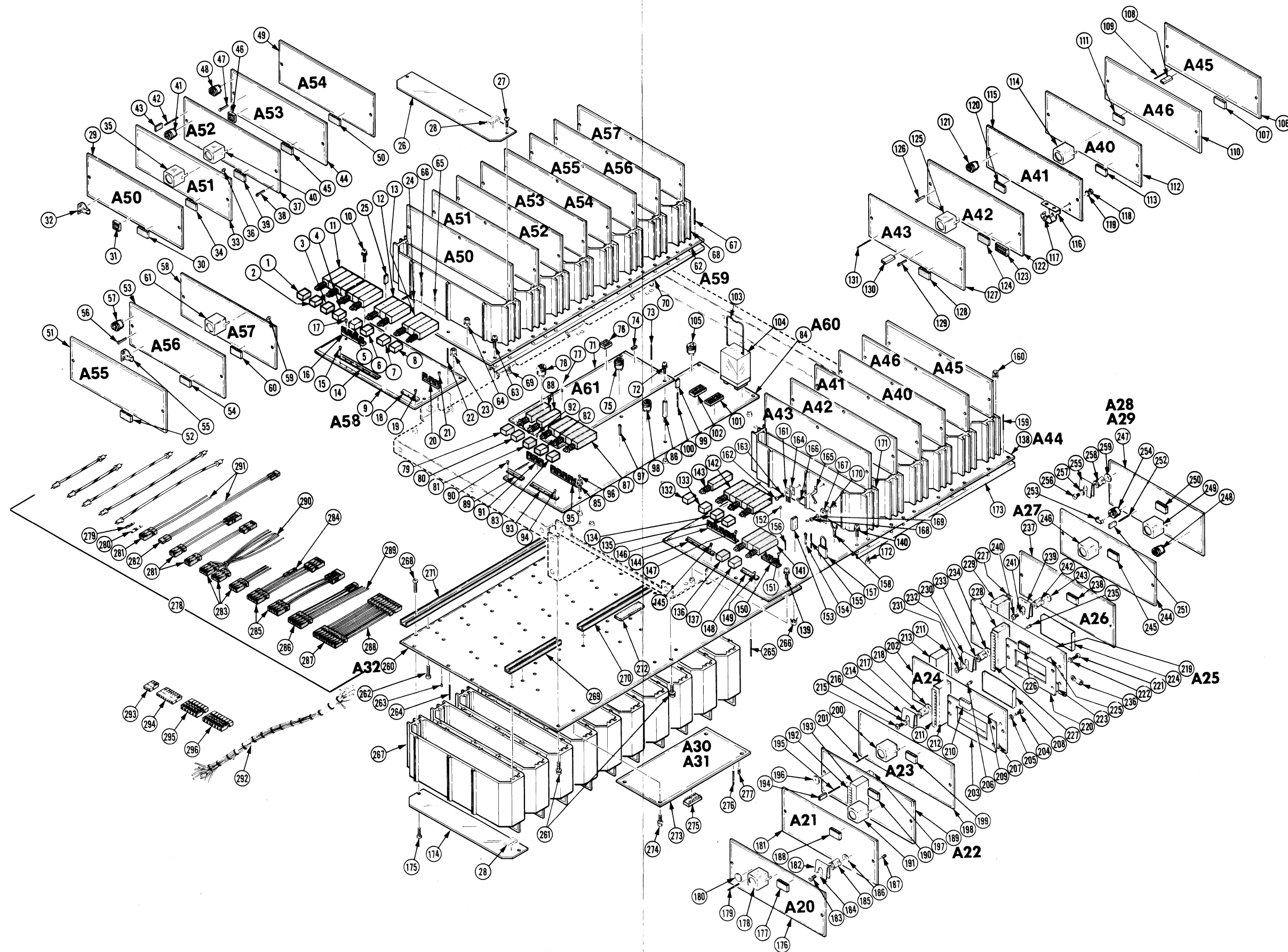


Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective    Discnt	Qty	12345    Name & Description	Mfr. Code	Mfr. Part No.
2-1	366-1557-71		1	PUSH BUTTON:BLACK,ENV	80009	366-1557-71
-2	366-1557-72		1	PUSH BUTTON:BLACK,BACK PORCH	80009	366-1557-72
-3	366-1557-01		1	PUSH BUTTON:SIL GY,SYNC TIP	80009	366-1557-01
-4	366-1557-75		1	PUSH BUTTON:BLACK,CONT	80009	366-1557-75
-5	366-1557-69		1	PUSH BUTTON:BLACK,OUT	80009	366-1557-69
-6	366-1557-70		1	PUSH BUTTON:BLACK,IN	80009	366-1557-70
-7	366-1402-98		1	PUSH BUTTON:SIL GY,OFF	80009	366-1402-98
-8	366-1489-95		1	PUSH BUTTON:SIL GY,ON	80009	366-1489-95
-9	-----		1	CKT BOARD ASSY:PHASE LOCK SW (SEE A58 REPL)		
-10	211-0116-00		4	SCR,ASSEM WSHR:4-40 X 0.312,PNH,BRS,NP,POZ (END ATTACHING PARTS) CKT BOARD ASSY INCLUDES:	77900	ORDER BY DESCR
-11	-----		1	.SWITCH PB ASSY:(SEE A58S22 REPL)		
-12	-----		1	.SWITCH PB ASSY:(SEE A58S25 REPL)		
-13	-----		1	.SWITCH PB ASSY:(SEE A58S28 REPL)		
-14	343-0495-07		1	.CLIP,SWITCH:FRONT,7.5MM X 7 UNIT (ATTACHING PARTS)	80009	343-0495-07
-15	210-3033-00		5	.EYELET,METALLIC:0.059 OD X 0.156 L,BRS (END ATTACHING PARTS)	07707	SE-25
-16	343-0499-13		1	.CLIP,SWITCH:7.5MM X 4 UNIT (ATTACHING PARTS)	80009	343-0499-13
-17	210-3033-00		3	.EYELET,METALLIC:0.059 OD X 0.156 L,BRS (END ATTACHING PARTS)	07707	SE-25
-18	343-0495-03		2	.CLIP,SWITCH:FRONT,7.5MM X 3 UNIT (ATTACHING PARTS)	80009	343-0495-03
-19	210-3033-00		4	.EYELET,METALLIC:0.059 OD X 0.156 L,BRS (END ATTACHING PARTS)	07707	SE-25
-20	343-0499-03		3	.CLIP,SWITCH:REAR,7.5MM X 3 UNIT (ATTACHING PARTS)	80009	343-0499-03
-21	210-3033-00		6	.EYELET,METALLIC:0.059 OD X 0.156 L,BRS (END ATTACHING PARTS)	07707	SE-25
-22	131-0589-00		28	.TERMINAL,PIN:	80009	131-0589-00
-23	131-1003-00		3	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-24	136-0252-07		3	.SOCKET,PIN CONN:SINGLE,PCB,T/G,0.030 H,0.05 .4 PCB,0.012-0.22 PIN SIZE,W/O DIMPLE,25000/ .REEL	80009	136-0252-07
-25	131-0993-00		1	.BUS,CONDUCTOR:SHUNT/SHORTING,;FEMALE,STR,1 .X 2,0.1 CTR,0.385 H,30 GOLD,BLACK;,,	22526	65474-006
-26	200-2077-00		14	COVER,CKT BOARD: (ATTACHING PARTS)	80009	200-2077-00
-27	211-0294-00		40	SCREW,MACHINE:M3 X 0.5 X 10MM,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESCR
-28	348-0594-00		28	PAD,CUSHIONING:0.8 X 0.4,SILICONE RUBBER	14890	ORDER BY DESCR
-29	-----		1	CKT BOARD ASSY:REF CONTROL(SEE A50 REPL)		
-30	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103
-31	136-0514-00		1	.SOCKET,DIP:PCB,;8 POS,2 X 4,0.1 X 0.3 CTR,0 .175 H X 0.130 TAIL,TIN,BECU;,,	09922	D1LB8P-108
-32	136-0208-00		1	.SKT,PL-IN ELEK:CRYSTAL,2 CONTAC W/CLIP	91506	8004-165
-33	-----		1	CKT BOARD ASSY:REF OSCILLATOR (SEE A51 REPL)		
-34	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103
-35	337-1417-00		2	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	32436	A-1020002-1
-36	386-1635-00		1	.SUPPORT,CKT BD:CHASSIS MT,ACETAL	80009	386-1635-00
-37	-----		1	CKT BOARD ASSY:PHASE SHIFTER (SEE A52 REPL)		
-38	214-0579-00		1	.TERM,TEST POINT:BRS CD PL	TK0858	ORDER BY DESCR
-39	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103
-40	337-1417-00		1	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	32436	A-1020002-1
-41	136-0237-00		1	.SKT,PL-IN ELEK:SEMICON DVC,8 CONT,PCB,0.20 .0 PIN CIRCLE,0.350 PCB,0.041 DIA PCB	71785	133-98-12-062
-42	131-0589-00		2	.TERMINAL,PIN:	80009	131-0589-00
-43	131-0993-00		1	.BUS,CONDUCTOR:SHUNT/SHORTING,;FEMALE,STR,1 .X 2,0.1 CTR,0.385 H,30 GOLD,BLACK;,,	22526	65474-006
-44	-----		1	CKT BOARD ASSY:CONV PHASE LOCK (SEE A53 REPL)		
-45	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103

## REPLACEABLE MECHANICAL PARTS - 1450-1

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2-46	136-0514-00		1	.SOCKET,DIP:PCB;8 POS,2 X 4,0.1 X 0.3 CTR,0 ..175 H X 0.130 TAIL,TIN,BECU;,,	09922	DILB8P-108
-47	214-0579-00		4	.TERM,TEST POINT:BRS CD PL	TK0858	ORDER BY DESCR
-48	136-0237-00		2	.SKT,PL-IN ELEK:SEMICON DVC,8 CONT,PCB,0.20 .0 PIN CIRCLE,0.350 PCB,0.041 DIA PCB	71785	133-98-12-062
-49	-----		1	CKT BOARD ASSY:DET/PHASE CONT (SEE A54 REPL)		
-50	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103
-51	-----		1	CKT BOARD ASSY:LIMITER(SEE A55 REPL)		
-52	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103
-53	-----		1	CKT BOARD ASSY:CONV CONTROL(SEE A56 REPL)		
-54	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103
-55	136-0208-00		1	.SKT,PL-IN ELEK:CRYSTAL,2 CONTAC W/CLIP	91506	8004-1G5
-56	214-0579-00		1	.TERM,TEST POINT:BRS CD PL	TK0858	ORDER BY DESCR
-57	136-0235-00		1	.SKT,PL-IN ELEK:TRANSISTOR,6 CONTACT,PCB MT	71785	133-96-12-062
-58	-----		1	CKT BOARD ASSY:CONVERTER OSC(SEE A57 REPL) (SEE A57 REPL)		
-59	386-1635-00		1	.SUPPORT,CKT BD:CHASSIS MT,ACETAL	80009	386-1635-00
-60	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103
-61	337-1417-00		2	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	32436	A-1020002-1
-62	-----		1	CKT BOARD ASSY:PH LOCK INTFC (SEE A59 REPL)		
-63	211-0121-00		8	SCR,ASSEM WSHR:4-40 X 0.438,PNH,BRS (END ATTACHING PARTS) CKT BOARD ASSY INCLUDES:	93907	ORDER BY DESCR
-64	131-1003-00		7	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-65	136-0252-07		7	.SOCKET,PIN CONN:SINGLE,PCB,T/G,0.030 H,0.05 .4 PCB,0.012-0.22 PIN SIZE,W/O DIMPLE,25000/ .REEL	80009	136-0252-07
-66	131-0589-00		13	.TERMINAL,PIN:	80009	131-0589-00
-67	131-0787-00		96	.TERMINAL,PIN:	80009	131-0787-00
-68	380-0503-02		13	HOUSING,CKT BD:5.775 X 1.92 W,AL (ATTACHING PARTS)	80009	380-0503-02
-69	211-0294-00		104	SCREW,MACHINE:M3 X 0.5 X 10MM,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESCR
-70	386-3726-00		2	STIF,CIRCUIT BD:7.35 L,AL	80009	386-3726-00
-71	-----		1	CKT BOARD ASSY:AGC RDOUT DRIVER (SEE A61 REPL)		
-72	211-0116-00		2	SCR,ASSEM WSHR:4-40 X 0.312,PNH,BRS,NP,POZ (END ATTACHING PARTS) CKT BOARD ASSY INCLUDES:	77900	ORDER BY DESCR
-73	131-0589-00		18	.TERMINAL,PIN:	80009	131-0589-00
-74	136-0328-03		27	.SOCKET,PIN TERM:U/W 0.025 SQ PINS	22526	47710
-75	136-0237-00		1	.SKT,PL-IN ELEK:SEMICON DVC,8 CONT,PCB,0.20 .0 PIN CIRCLE,0.350 PCB,0.041 DIA PCB	71785	133-98-12-062
-76	136-0514-00		1	.SOCKET,DIP:PCB;8 POS,2 X 4,0.1 X 0.3 CTR,0 ..175 H X 0.130 TAIL,TIN,BECU;,,	09922	DILB8P-108
-77	214-0579-00		1	.TERM,TEST POINT:BRS CD PL	TK0858	ORDER BY DESCR
-78	136-0235-00		1	.SKT,PL-IN ELEK:TRANSISTOR,6 CONTACT,PCB MT	71785	133-96-12-062
-79	366-1557-77		1	PUSH BUTTON:BLACK,10 DB	80009	366-1557-77
-80	366-1557-73		1	PUSH BUTTON:BLACK,20 DB	80009	366-1557-73
-81	366-1557-72		1	PUSH BUTTON:BLACK,BACK PORCH	80009	366-1557-72
-82	366-1557-01		1	PUSH BUTTON:SIL GY,SYNC TIP	80009	366-1557-01
-83	366-1557-68		1	PUSH BUTTON:BLACK,MAN	80009	366-1557-68
-84	-----		1	CKT BOARD ASSY:A.G.C. LOGIC(SEE A60 REPL) (ATTACHING PARTS)		
-85	211-0116-00		4	SCR,ASSEM WSHR:4-40 X 0.312,PNH,BRS,NP,POZ	77900	ORDER BY DESCR
-86	129-0456-00		2	SPACER,POST:0.75 L,4-40 STUD/TAP,BRS,CU SN ZN PL,0.188 HEX (END ATTACHING PARTS) CKT BOARD ASSY INCLUDES:	80009	129-0456-00
-87	-----		1	.SWITCH PB ASSY:(SEE A60S06 REPL)		
-88	-----		2	.SWITCH PB ASSY:(SEE A60S01,A60S03 REPL)		
-89	343-0495-03		1	.CLIP,SWITCH:FRONT,7.5MM X 3 UNIT (ATTACHING PARTS)	80009	343-0495-03
-90	210-3033-00		3	.EYELET,METALLIC:0.059 OD X 0.156 L,BRS	07707	SE-25

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective    Discnt	Qty	12345    Name & Description	Mfr. Code	Mfr. Part No.
2-				.(END ATTACHING PARTS)		
-91	343-0499-12		1	.CLIP,SWITCH:REAR,7.5MM X 3 UNIT	80009	343-0499-12
				.(ATTACHING PARTS)		
-92	210-3033-00		3	.EYELET,METALLIC:0.059 OD X 0.156 L,BRS	07707	SE-25
				.(END ATTACHING PARTS)		
-93	343-0495-05		1	.CLIP,SWITCH:FRONT,7.5MM X 5 UNIT	80009	343-0495-05
				.(ATTACHING PARTS)		
-94	210-3033-00		4	.EYELET,METALLIC:0.059 OD X 0.156 L,BRS	07707	SE-25
				.(END ATTACHING PARTS)		
-95	343-0499-14		1	.CLIP,SWITCH:7.5MM X 5 UNIT	80009	343-0499-14
				.(ATTACHING PARTS)		
-96	210-3033-00		4	.EYELET,METALLIC:0.059 OD X 0.156 L,BRS	07707	SE-25
				.(END ATTACHING PARTS)		
-97	214-0579-00		4	.TERM,TEST POINT:BRS CD PL	TK0858	ORDER BY DESCR
-98	136-0237-00		1	.SKT,PL-IN ELEK:SEMICON DVC,8 CONT,PCB,0.20	71785	133-98-12-062
				.O PIN CIRCLE,0.350 PCB,0.041 DIA PCB		
-99	131-0993-00		1	.BUS,CONDUCTOR:SHUNT/SHORTING,;FEMALE,STR,1	22526	65474-006
				.X 2,0.1 CTR,0.385 H,30 GOLD,BLACK,;,		
-100	131-0589-00		97	.TERMINAL,PIN:	80009	131-0589-00
-101	136-0729-00		2	.SOCKET,DIP:PCB,;FEMALE,STR,2 X 8,16 POS,0.1	09922	DILB16P-108T
				.X 0.3 CTR,0.175 H X 0.130 TAIL,BECU,TIN		
	136-0260-02		1	.SOCKET,DIP:PCB,;16 POS,2 X 8,0.1 X 0.3 CTR,	09922	DILB16P-108T
				.0.175 H X 0.140,TIN,BECU,;,		
-102	136-0269-02		1	.SOCKET,DIP::PCB,;14 POS,2 X 7,0.1 X 0.3 CTR	09922	DILB14P-108T
				.0.150 H X 0.140 TAIL,75 GOLD,;,		
	136-0727-00	B020675	1	.SKT,PL-IN ELEK:MICROCKT,8 CONTACT	09922	DILB8P-108
				.(USED AT A60U45)		
-103	136-0394-00		1	.SKT,PL-IN ELEK:RELAY,10 CONTACT	12300	27E709 W/20C249
-104	-----		1	.RELAY ARMATURE:(SEE A60K97 REPL)		
-105	136-0241-00		1	.SKT,PL-IN ELEK:MICROCIRCUIT,10 CONT,PCB MT	71785	133-99-12-064
-106	-----		1	CKT BOARD ASSY:Q-P FILTER AMP(SEE A45 REPL)		
-107	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103
-108	131-0993-07		1	.BUS,CONDUCTOR:SHUNT ASSEMBLY,VIOLET	00779	850100-7
-109	131-0608-00		12	.TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	80009	131-0608-00
-110	-----		1	CKT BOARD ASSY:IF LIMITER (SEE A46 REPL)		
-111	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103
-112	-----		1	CKT BOARD ASSY:1ST AUD MIXER		
				(SEE A40 REPL)		
-113	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103
-114	337-1417-00		3	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	32436	A-1020002-1
-115	-----		1	CKT BOARD ASSY:2ND AUD MIXER		
				(SEE A41 REPL)		
-116	136-0153-00		1	.SKT,PL-IN ELEK:CRYSTAL,2 CONT W/CLAMP	91506	8000AG6
				.(ATTACHING PARTS)		
-117	211-0022-00		2	.SCREW,MACHINE:2-56 X 0.188,PNH,STL	TK0435	ORDER BY DESCR
-118	210-0405-00		2	.NUT,PLAIN,HEX:2-56 X 0.188,BRS CD PL	73743	12157-50
-119	210-0001-00		2	.WASHER,LOCK:#2 INTL,0.013 THK,STL	77900	1202-00-00-0541C
				.(END ATTACHING PARTS)		
-120	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103
-121	136-0237-00		1	.SKT,PL-IN ELEK:SEMICON DVC,8 CONT,PCB,0.20	71785	133-98-12-062
				.O PIN CIRCLE,0.350 PCB,0.041 DIA PCB		
-122	-----		1	CKT BOARD ASSY:AUD LIMITER(SEE A42 REPL)		
-123	136-0269-02		1	.SOCKET,DIP::PCB,;14 POS,2 X 7,0.1 X 0.3 CTR	09922	DILB14P-108T
				.0.150 H X 0.140 TAIL,75 GOLD,;,		
-124	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103
-125	337-1417-00		4	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	32436	A-1020002-1
-126	214-0579-00		1	.TERM,TEST POINT:BRS CD PL	TK0858	ORDER BY DESCR
-127	-----		1	CKT BOARD ASSY:AUD DSCRM(SEE A43 REPL)		
-128	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103
-129	214-0579-00		1	.TERM,TEST POINT:BRS CD PL	TK0858	ORDER BY DESCR
-130	131-0993-00		1	.BUS,CONDUCTOR:SHUNT/SHORTING,;FEMALE,STR,1	22526	65474-006
				.X 2,0.1 CTR,0.385 H,30 GOLD,BLACK,;,		
-131	131-0608-00		3	.TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	80009	131-0608-00
-132	366-1480-00		1	PUSH BUTTON:BLK,0.328 X 0.253 X 0.43	80009	366-1480-00
-133	366-1557-76		1	PUSH BUTTON:BLACK,SPLIT	80009	366-1557-76
-134	366-1557-74		1	PUSH BUTTON:BLACK,INTR	80009	366-1557-74
-135	366-1489-26		1	PUSH BUTTON:QUASI	80009	366-1489-26
-136	366-1557-69		1	PUSH BUTTON:BLACK,OUT	80009	366-1557-69

## REPLACEABLE MECHANICAL PARTS - 1450-1

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2-137	366-1557-70		1	PUSH BUTTON:BLACK,IN	80009	366-1557-70
-138	-----		1	CKT BOARD ASSY:AUDIO INTFC(SEE A44 REPL) (ATTACHING PARTS)		
-139	211-0116-00		2	SCR,ASSEM WSHR:4-40 X 0.312,PNH,BRS,NP,POZ	77900	ORDER BY DESCR
-140	211-0121-00		6	SCR,ASSEM WSHR:4-40 X 0.438,PNH,BRS (END ATTACHING PARTS)	93907	ORDER BY DESCR
				CKT BOARD ASSY INCLUDES:		
-141	-----		1	.SWITCH PB ASSY:(SEE A44S07 REPL)		
-142	-----		1	.SWITCH PB ASSY:(SEE A44S04 REPL)		
-143	-----		1	.SWITCH PB ASSY:(SEE A44S01 REPL)		
-144	343-0495-05		1	.CLIP,SWITCH:FRONT,7.5MM X 5 UNIT (ATTACHING PARTS)	80009	343-0495-05
-145	210-3033-00		3	.EYELET,METALLIC:0.059 OD X 0.156 L,BRS (END ATTACHING PARTS)	07707	SE-25
-146	343-0499-14		1	.CLIP,SWITCH:7.5MM X 5 UNIT (ATTACHING PARTS)	80009	343-0499-14
-147	210-3033-00		3	.EYELET,METALLIC:0.059 OD X 0.156 L,BRS (END ATTACHING PARTS)	07707	SE-25
-148	343-0495-03		2	.CLIP,SWITCH:FRONT,7.5MM X 3 UNIT (ATTACHING PARTS)	80009	343-0495-03
-149	210-3033-00		4	.EYELET,METALLIC:0.059 OD X 0.156 L,BRS (END ATTACHING PARTS)	07707	SE-25
-150	343-0499-12		2	.CLIP,SWITCH:REAR,7.5MM X 3 UNIT (ATTACHING PARTS)	80009	343-0499-12
-151	210-3033-00		4	.EYELET,METALLIC:0.059 OD X 0.156 L,BRS (END ATTACHING PARTS)	07707	SE-25
-152	136-0252-07		4	.SOCKET,PIN CONN:SINGLE,PCB,T/G,0.030 H,0.05 .4 PCB,0.012-0.22 PIN SIZE,W/O DIMPLE,25000/ .REEL	80009	136-0252-07
-153	131-0993-00		3	.BUS,CONDUCTOR:SHUNT/SHORTING,;FEMALE,STR,1 .X 2,0.1 CTR,0.385 H,30 GOLD,BLACK,;,	22526	65474-006
-154	214-0579-00		2	.TERM,TEST POINT:BRS CD PL	TK0858	ORDER BY DESCR
-155	131-0589-00		25	.TERMINAL,PIN:	80009	131-0589-00
-156	131-0608-00		8	.TERMINAL,PIN:0.365 L X 0.025 BRZ GLD PL	80009	131-0608-00
-157	352-0783-00		1	.HLDR,TERM CONN:2,26 AWG WHITE	80009	352-0783-00
-158	344-0286-00		4	.CLIP,ELECTRICAL:FUSE,SPR BRS	75915	102074
-159	131-0787-00		48	.TERMINAL,PIN:	80009	131-0787-00
-160	131-1003-00		4	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-161	-----		4	TRANSISTOR:(SEE Q61,Q62,Q63,Q64 REPL) (ATTACHING PARTS)		
-162	211-0007-00		4	SCREW,MACHINE:4-40 X 0.188,PNH,STL	93907	ORDER BY DESCR
-163	210-1178-00		4	WASHER,SHLDR: (END ATTACHING PARTS)	80009	210-1178-00
-164	342-0563-00		4	INSULATOR,PLATE:TRANSISTOR,FIBERGLASS REINF ORCED SILICON RUBBER	18565	69-11-8805-1674
-165	343-0783-00	B020000	1	CLAMP,XSTR:COPPER BERYLLIUM (ATTACHING PARTS)	80009	343-0783-00
-166	211-0005-00	B020000	1	SCREW,MACHINE:4-40 X 0.125,PNH,STL (END ATTACHING PARTS)	TK0435	ORDER BY DESCR
-167	-----		2	TRANSISTOR:(SEE Q65,Q67 REPL) (ATTACHING PARTS)		
-168	211-0008-00		2	SCREW,MACHINE:4-40 X 0.25,PNH,STL	93907	ORDER BY DESCR
-169	210-1122-00		2	WASHER,LOCK:0.12 ID,DISHED,0.025 THK,STL (END ATTACHING PARTS)	86928	ORDER BY DESCR
-170	342-0363-00		2	INSULATOR,PLATE:XSTR,TO-126,SILICONE RUBBER	55285	7403-09FR-50
-171	380-0503-04		1	HOUSING,CKT BD:W/HOLES,A1 (ATTACHING PARTS)	80009	380-0503-04
-172	211-0294-00		28	SCREW,MACHINE:M3 X 0.5 X 10MM,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESCR
-173	386-5243-00		2	STIF,CIRCUIT BD:8.4 L,A1	80009	386-5243-00
-174	200-2077-00		10	COVER,CKT BOARD: (ATTACHING PARTS)	80009	200-2077-00
-175	213-0294-00		20	SCREW,ADJUSTING:10-32 X 2.75,SST (END ATTACHING PARTS)	80009	213-0294-00
-176	-----		1	CKT BOARD ASSY:I.F. FLTR/AMP (SEE A20 REPL)		
-177	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103
-178	337-1417-00		4	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	32436	A-1020002-1

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
2-179	131-0589-00		8		. TERMINAL, PIN:	80009	131-0589-00
-180	214-0817-00		4		. HEAT SINK, XSTR: TO-5, BE OXD	14566	A11193-T05
-181	-----		1		CKT BOARD ASSY: I.F. ATTN/AMPL (SEE A21 REPL)		
-182	214-2746-00		1		. HEAT SINK, XSTR: TO-39, AL (ATTACHING PARTS)	80009	214-2746-00
-183	211-0005-00		1		. SCREW, MACHINE: 4-40 X 0.125, PNH, STL	TK0435	ORDER BY DESCR
-184	210-0004-00		1		. WASHER, LOCK: #4 INTL, 0.015 THK, STL	77900	1204-00-00-0541C
-185	214-2569-00		1		. HEAT SINK, XSTR: TO-5, CU BE (END ATTACHING PARTS)	05820	260-4 TH5B
-186	214-0817-00		1		. HEAT SINK, XSTR: TO-5, BE OXD	14566	A11193-T05
-187	386-1635-00		1		. SUPPORT, CKT BD: CHASSIS MT, ACETAL	80009	386-1635-00
-188	131-1771-00		2		. CONN, BOX:	TK1483	TKO-06254-103
-189	-----		1		CKT BOARD ASSY: I.F. MIXER (SEE A22 REPL)		
-190	131-1771-00		2		. CONN, BOX:	TK1483	TKO-06254-103
-191	337-1417-00		2		. SHIELD, ELEC: 0.55 SQ X 0.685 INCH HIGH	32436	A-1020002-1
-192	337-2535-00	AR	1		. SHLD GSKT, ELEK: BERYLLIUM COPPER	TK1099	97-555-CDC-X
-193	337-2459-00		1		. SHIELD, ELEC: CIRCUIT BOARD;; SHIELD ELEC	80009	337-2459-00
-194	131-0993-00		2		. BUS, CONDUCTOR: SHUNT/SHORTING;; FEMALE, STR, 1 . X 2, 0.1 CTR, 0.385 H, 30 GOLD, BLACK;...	22526	65474-006
-195	131-0608-00		7		. TERMINAL, PIN: 0.365 L X 0.025 BRZ GLD PL	80009	131-0608-00
-196	214-0817-00		2		. HEAT SINK, XSTR: TO-5, BE OXD	14566	A11193-T05
-197	337-2601-01		1		. SHIELD, ELEC: CIRCUIT BOARD	80009	337-2601-01
-198	-----		1		CKT BOARD ASSY: I.F. ATTN/AUD (SEE A23 REPL)		
-199	131-1771-00		2		. CONN, BOX:	TK1483	TKO-06254-103
-200	337-1417-00		4		. SHIELD, ELEC: 0.55 SQ X 0.685 INCH HIGH	32436	A-1020002-1
-201	131-0589-00		8		. TERMINAL, PIN:	80009	131-0589-00
-202	-----		1		CKT BD ASSY: I.F.S.W.F. PREAMP (SEE A24 REPL)		
-203	343-0730-00		1		. CLAMP, FILTER: ALUMINUM (ATTACHING PARTS)	80009	343-0730-00
-204	211-0034-00		4		. SCREW, MACHINE: 2-56 X 0.5, PNH, STL	06950	ORDER BY DESCR
-205	210-0001-00		4		. WASHER, LOCK: #2 INTL, 0.013 THK, STL (END ATTACHING PARTS)	77900	1202-00-00-0541C
-206	386-1635-00		1		. SUPPORT, CKT BD: CHASSIS MT, ACETAL	80009	386-1635-00
-207	337-2540-00		1		. SHLD GSKT, ELEK: 2.25 X 0.375 X 0.062	80009	337-2540-00
-208	337-2535-00		1		. SHLD GSKT, ELEK: BERYLLIUM COPPER	TK1099	97-555-CDC-X
-209	136-0333-00		10		. SOCKET, PIN TERM:	00779	1-331677-4
-210	131-1771-00		2		. CONN, BOX:	TK1483	TKO-06254-103
-211	131-2617-00	AR	1		. TERM STRIP, GND: CU-BE;; TERN STRIP, GND	80009	131-2617-00
-212	337-2459-00		1		. SHIELD, ELEC: CIRCUIT BOARD;; SHIELD ELEC	80009	337-2459-00
-213	337-2578-00		1		. SHIELD, ELEC: CIRCUIT BOARD;; SHIELD ELEC	80009	337-2578-00
-214	214-2746-00		1		. HEAT SINK, XSTR: TO-39, AL (ATTACHING PARTS)	80009	214-2746-00
-215	211-0005-00		1		. SCREW, MACHINE: 4-40 X 0.125, PNH, STL	TK0435	ORDER BY DESCR
-216	210-0004-00		1		. WASHER, LOCK: #4 INTL, 0.015 THK, STL	77900	1204-00-00-0541C
-217	214-2569-00		1		. HEAT SINK, XSTR: TO-5, CU BE (END ATTACHING PARTS)	05820	260-4 TH5B
-218	214-0817-00		1		. HEAT SINK, XSTR: TO-5, BE OXD	14566	A11193-T05
-219	-----		1		CKT BD ASSY: I.F.S.W.F. PREAMP (SEE A25 REPL)		
-220	343-0730-00		1		. CLAMP, FILTER: ALUMINUM (ATTACHING PARTS)	80009	343-0730-00
-221	211-0034-00		4		. SCREW, MACHINE: 2-56 X 0.5, PNH, STL	06950	ORDER BY DESCR
-222	210-0001-00		4		. WASHER, LOCK: #2 INTL, 0.013 THK, STL (END ATTACHING PARTS)	77900	1202-00-00-0541C
-223	337-2540-00		1		. SHLD GSKT, ELEK: 2.25 X 0.375 X 0.062	80009	337-2540-00
-224	337-2535-00		1		. SHLD GSKT, ELEK: BERYLLIUM COPPER	TK1099	97-555-CDC-X
-225	136-0333-00		10		. SOCKET, PIN TERM:	00779	1-331677-4
-226	131-1771-00		2		. CONN, BOX:	TK1483	TKO-06254-103
-227	131-2617-00	AR	1		. TERM STRIP, GND: CU-BE;; TERN STRIP, GND	80009	131-2617-00
-228	337-2459-00		1		. SHIELD, ELEC: CIRCUIT BOARD;; SHIELD ELEC	80009	337-2459-00
-229	337-2578-00		1		. SHIELD, ELEC: CIRCUIT BOARD;; SHIELD ELEC	80009	337-2578-00
-230	214-2746-00		1		. HEAT SINK, XSTR: TO-39, AL (ATTACHING PARTS)	80009	214-2746-00
-231	211-0005-00		1		. SCREW, MACHINE: 4-40 X 0.125, PNH, STL	TK0435	ORDER BY DESCR
-232	210-0004-00		1		. WASHER, LOCK: #4 INTL, 0.015 THK, STL	77900	1204-00-00-0541C

## REPLACEABLE MECHANICAL PARTS - 1450-1

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345 Name & Description	Mfr. Code	Mfr. Part No.
2-233	214-2569-00		1	.HEAT SINK,XSTR:TO-5,CU BE (END ATTACHING PARTS)	05820	260-4 TH58
-234	214-0817-00		1	.HEAT SINK,XSTR:TO-5,BE OXD	14566	A11193-T05
-235	386-1635-00		1	.SUPPORT,CKT BD:CHASSIS MT,ACETAL	80009	386-1635-00
-236	210-0340-00		4	.TERMINAL,LUG:#6,PLAIN,COPPER,TIN PL	00779	34158
-237	-----		1	CKT BOARD ASSY:I.F.S.W.F. POSTAMP (SEE A26 REPL)		
-238	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103
-239	214-2746-00		1	.HEAT SINK,XSTR:TO-39,AL (ATTACHING PARTS)	80009	214-2746-00
-240	211-0005-00		1	.SCREW,MACHINE:4-40 X 0.125,PNH,STL	TK0435	ORDER BY DESCR
-241	210-0004-00		1	.WASHER,LOCK:#4 INTL,0.015 THK,STL	77900	1204-00-00-0541C
-242	214-2569-00		1	.HEAT SINK,XSTR:TO-5,CU BE (END ATTACHING PARTS)	05820	260-4 TH58
-243	214-0817-00		1	.HEAT SINK,XSTR:TO-5,BE OXD	14566	A11193-T05
-244	-----		1	CKT BD ASSY:I.F. ZERO CARRIER (SEE A27 REPL)		
-245	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103
-246	337-1417-00		5	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	32436	A-1020002-1
-247	-----		2	CKT BD ASSY:DET-VIDEO AMP (SEE A28,A29 REPL)		
-248	136-0241-00		1	.SKT,PL-IN ELEK:MICROCIRCUIT,10 CONT,PCB MT	71785	133-99-12-064
-249	337-1417-00		3	.SHIELD,ELEC:0.55 SQ X 0.685 INCH HIGH	32436	A-1020002-1
-250	131-1771-00		2	.CONN,BOX:	TK1483	TKO-06254-103
-251	131-0993-00		1	.BUS,CONDUCTOR:SHUNT/SHORTING,;FEMALE,STR,1 .X 2,0.1 CTR,0.385 H,30 GOLD,BLACK,;,	22526	65474-006
-252	131-0589-00		3	.TERMINAL,PIN:	80009	131-0589-00
-253	214-0973-00		3	.HEAT SINK,XSTR:TO-92,CU BE CD PL	80009	214-0973-00
-254	136-0235-00		3	.SKT,PL-IN ELEK:TRANSISTOR,6 CONTACT,PCB MT	71785	133-96-12-062
-255	214-2746-00		1	.HEAT SINK,XSTR:TO-39,AL (ATTACHING PARTS)	80009	214-2746-00
-256	211-0005-00		1	.SCREW,MACHINE:4-40 X 0.125,PNH,STL	TK0435	ORDER BY DESCR
-257	210-0004-00		1	.WASHER,LOCK:#4 INTL,0.015 THK,STL	77900	1204-00-00-0541C
-258	214-2569-00		1	.HEAT SINK,XSTR:TO-5,CU BE (END ATTACHING PARTS)	05820	260-4 TH58
-259	214-0817-00		1	.HEAT SINK,XSTR:TO-5,BE OXD	14566	A11193-T05
-260	-----		1	CKT BOARD ASSY:I.F. INTERFACE (SEE A32 REPL)		
-261	211-0116-00		4	SCR,ASSEM WSHR:4-40 X 0.312,PNH,BRS,NP,POZ	77900	ORDER BY DESCR
-262	211-0121-00		8	SCR,ASSEM WSHR:4-40 X 0.438,PNH,BRS (END ATTACHING PARTS)	93907	ORDER BY DESCR
-263	136-0252-07		15	CKT BOARD ASSY INCLUDES: .SOCKET,PIN CONN:SINGLE,PCB,T/G,0.030 H,0.05 .4 PCB,0.012-0.22 PIN SIZE,W/O DIMPLE,25000/ .REEL	80009	136-0252-07
-264	131-0589-00		6	.TERMINAL,PIN:	80009	131-0589-00
	131-0590-00		8	.TERMINAL,PIN:0.71 L X 0.025 SQ PH BRZ	80009	131-0590-00
-265	131-0787-00		123	.TERMINAL,PIN:	80009	131-0787-00
-266	131-1003-00		12	.CONN,RCPT,ELEC:CKT BD MT,3 PRONG	80009	131-1003-00
-267	380-0502-01		10	HOUSING,CKT BD:5.775 L X 2.13 W,AL (ATTACHING PARTS)	80009	380-0502-01
-268	211-0294-00		80	SCREW,MACHINE:M3 X 0.5 X 10MM,PNH,STL (END ATTACHING PARTS)	83486	ORDER BY DESCR
-269	386-3803-00		1	STIF,CIRCUIT BD:2.95 L,ALUMINUM	80009	386-3803-00
-270	386-3804-00		1	STIF,CIRCUIT BD:9.1 L,ALUMINUM	80009	386-3804-00
-271	386-3725-00		1	STIF,CIRCUIT BD:12.65 L,AL	80009	386-3725-00
-272	342-0202-00		3	INSULATOR,PLATE:TRANSISTOR,MICA	91500	10-21-023-106
-273	-----		2	CKT BOARD ASSY:PIN DRIVER (SEE A30,A31 REPL)		
-274	211-0116-00		8	SCR,ASSEM WSHR:4-40 X 0.312,PNH,BRS,NP,POZ (END ATTACHING PARTS)	77900	ORDER BY DESCR
-275	136-0729-00		3	CKT BOARD ASSY INCLUDES: .SOCKET,DIP:PCB,;FEMALE,STR,2 X 8,16 POS,0.1 .X 0.3 CTR,0.175 H X 0.130 TAIL,BECU,TIN	09922	DILB16P-108T
-276	131-0589-00		5	.TERMINAL,PIN:	80009	131-0589-00

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No.		Qty	12345 Name & Description	Mfr.	
		Effective	Discont			Code	Mfr. Part No.
2-277	136-0263-04			10	.SOCKET,PIN TERM:U/W 0.025 SQ PIN	80009	136-0263-04
-278	198-3693-01			1	WIRE SET,ELEC:	TK1375	ORDER BY DESCR
-279	131-0707-00			6	.CONTACT,ELEC:22-26 AWG,BRS,CU BE GLD PL	80009	131-0707-00
-280	131-0621-00			58	.CONN,TERM:22-26 AWG,BRS,CU BE GLD PL	80009	131-0621-00
-281	352-0198-00			5	.HLDR,TERM CONN:2 WIRE,BLACK	80009	352-0198-00
-282	352-0169-00			3	.HLDR,TERM CONN:2 WIRE,BLACK	80009	352-0169-00
-283	352-0199-00			5	.HLDR,TERM CONN:3 WIRE,BLACK	80009	352-0199-00
-284	352-0197-00			1	.HLDR,TERM CONN:1 WIRE,BLACK	80009	352-0197-00
-285	352-0200-00			2	.HLDR,TERM CONN:4 WIRE,BLACK	80009	352-0200-00
-286	352-0201-00			1	.HLDR,TERM CONN:5 WIRE,BLACK	80009	352-0201-00
-287	352-0205-00			2	.HLDR,TERM CONN:9 WIRE,BLACK	80009	352-0205-00
-288	175-0832-00			AR	.CABLE,SP,ELEC:	08261	111-2699-956
-289	175-0828-00			AR	.CABLE,SP,ELEC:5,26 AWG,STRD,PVC JKT,RBN	08261	111-2699-955
-290	175-0826-00			AR	.CABLE,SP,ELEC:3,26 AWG,STRD,PVC JKT,RBN	80009	175-0826-00
-291	175-0825-00			AR	.CABLE,SP,ELEC:2,26 AWG,STRD,PVC JKT,RBN,BRN . & RED	80009	175-0825-00
-292	179-2570-00	B020000	B021043	1	WIRING HARNESS:MAIN	TK1375	ORDER BY DESCR
	179-2570-02	B021044		1	WIRING HARNESS:MAIN,14501/14502	80009	179-2570-02
	346-0235-00			66	.STRAP,TIEDOWN E:0.1 W X 4.1 L,NYLON	06383	PLT1M-DTP
	131-0621-00			110	.CONN,TERM:22-26 AWG,BRS,CU BE GLD PL	80009	131-0621-00
	131-0707-00			10	.CONTACT,ELEC:22-26 AWG,BRS,CU BE GLD PL	80009	131-0707-00
	131-0792-00			3	.CONN,TERM RCPT:	80009	131-0792-00
	210-0287-00			4	.TERMINAL,LUG:#6,RING,SOLDERLESS BRS TIN PL	80009	210-0287-00
-293	352-0161-00	B020000	B021043	2	.HLDR,TERM CONN:3 WIRE,BLACK	80009	352-0161-00
	352-0162-00	B021044		2	.HLDR,TERM CONN:4 WIRE,BLACK	80009	352-0162-00
-294	352-0166-00			1	.HLDR,TERM CONN:8 WIRE,BLACK	80009	352-0166-00
	352-0169-00			1	.HLDR,TERM CONN:2 WIRE,BLACK	80009	352-0169-00
	352-0197-00			1	.HLDR,TERM CONN:1 WIRE,BLACK	80009	352-0197-00
	352-0198-00			3	.HLDR,TERM CONN:2 WIRE,BLACK	80009	352-0198-00
	352-0199-00			4	.HLDR,TERM CONN:3 WIRE,BLACK	80009	352-0199-00
	352-0200-00			3	.HLDR,TERM CONN:4 WIRE,BLACK	80009	352-0200-00
	352-0201-00			8	.HLDR,TERM CONN:5 WIRE,BLACK	80009	352-0201-00
-295	352-0202-00			3	.HLDR,TERM CONN:6 WIRE,BLACK	80009	352-0202-00
-296	352-0203-00			4	.HLDR,TERM CONN:7 WIRE,BLACK	80009	352-0203-00
	352-0204-00			2	.HLDR,TERM CONN:8 WIRE,BLACK	80009	352-0204-00



## REPLACEABLE MECHANICAL PARTS - 1450-1

Fig. & Index No.	Tektronix Part No.	Serial/Assembly No. Effective Dscont	Qty	12345	Name & Description	Mfr. Code	Mfr. Part No.
3-1	175-2140-00		1		CABLE ASSY,RF:50 OHM COAX,30.0 L	80009	175-2140-00
-2	012-0751-00		1		CABLE,INTCON:7.375 L	80009	012-0751-00
-3	067-0709-00		1		FIXTURE,CAL:30.0 L,CABLE ASSY	80009	067-0709-00
-4	012-0752-00		1		CABLE,INTCON:7.5 L	80009	012-0752-00
-5	003-0816-00	B010100 B020337	1		BIT,SCREWDRIVER:FOR TORX SCREWS,0.25 IN BIN W/T10 POINT,8.0 L	80009	003-0816-00
	003-0814-00	B020338	1		BIT,SCREWDRIVER:0.25 DRIVE W/TORX T10 TIP M AGNA #37157-4 OR EQUAL	80009	003-0814-00
-6	670-5034-00		1		CIRCUIT BD ASSY:EXTENDER	80009	670-5034-00
-7	103-0045-00		1		ADAPTER,CONN:N MALE TO BNC FEMALE	24931	29 JP104-3
-8	131-1007-00		1		CONN,D-SUB::SLDR CUP/PNL,,MALE,STR,9 POS,0. 112 CTR,0.120 MTG HOLE,ACCOM 20 AWG;,,	00779	747904-2
-9	200-1170-00		1		SHLD,ELEC CONN:9 CONTACT,STL CD PL	80009	200-1170-00
-10	213-0260-00		2		SCREW-LOCK ASSY:4-40 FILH W/STL CLIP	71468	D20419-16
-11	331-0393-12		1		SCALE,CRT:EXT,NTSC,PHASE,PHOTO,CLEAR PHOTOG RAPHIC	80009	331-0393-12
-12	351-0301-03		1		SLIDE,DWR,EXT:W/CLOSED MOUNTING SLOTS	80009	351-0301-03
-13	161-0066-00		1		CABLE ASSY,PWR,:3,18AWG,115V,98.0 L	80009	161-0066-00
-14	161-0066-09		1		CABLE ASSY,PWR,:3,0.75MM SQ,220V,99.0 L (A1 EUROPEAN ONLY)	80009	161-0066-09
-15	161-0066-10		1		CABLE ASSY,PWR,:THREE 0.75MM SQ,250V,2.5 ME TERS LONG,UNITED KINGDOM (A2 UNITED KINGDOM ONLY)	TK1373	24230
-16	161-0066-11		1		CABLE ASSY,PWR,:3,0.75MM,240V,96.0 L (A3 AUSTRALIAN ONLY)	80009	161-0066-11
-17	161-0066-12		1		CABLE ASSY,PWR,:3,18 AWG,250V,99.0 L (A4 NORTH AMERICAN ONLY)	70903	CH-77893
	070-5568-00		1		MANUAL,TECH:INSTR,14501	80009	070-5568-00
	015-0352-00		1		ACCESSORY ASSY:250KHZ,LOW PASS FILTER	80009	015-0352-00

